ARCHAEOLOGICAL EXCAVATIONS AT MERCIA MARINA, WILLINGTON

By JAMES BRIGHTMAN and CLIVE WADDINGTON

(Archaeological Research Services Ltd, Angel House, Portland Square, Bakewell, Derbyshire, DE45 1HB)

with contributions from

P. ALLEN (Archaeological Research Services Ltd),

J. JONES (Archaeological Services Durham University, South Road, Durham, DH1 3LE),

P.D. MARSHALL (Chronologies, 25 Onslow Road, Sheffield, S11 7AF),

C. PRIOR (Rafter Radiocarbon Laboratory, Institute of Geological and Nuclear Sciences, Box 31 312, Lower Hutt, New Zealand),

HELEN RANNER (Archaeological Services Durham University) and A.THORNTON (Archaeological Research Services Ltd)

SUMMARY

An archaeological excavation was conducted by Archaeological Research Services Ltd (ARS Ltd) on selected areas at the site of the Mercia Marina development, Findern Lane, Willington, Derbyshire. Investigation took the form of strip, map and sample, involving topsoil stripping of three areas highlighted by the Derbyshire County Council (DCC) Development Control Archaeologist as having evidence for surviving archaeological remains, known through aerial photography and earlier evaluation work.

Archaeological remains were excavated dating from most periods of prehistory including:

- *possible Late Upper Palaeolithic stone tools recovered from the glacial sands and gravels which form the first natural substratum on the site*
- *Mesolithic flints and a possible Mesolithic pit feature*
- *Early Neolithic 'midden pits' containing Carinated Bowl pottery and a small number of Impressed Ware sherds together with a few lithics*
- *Early Bronze Age funerary monuments in the form of two ring ditches, one of which was closely associated with two cremation pits*
- *Early Bronze Age structural remains comprising four discrete post-built structures*
- *a Middle Bronze Age pit containing ceramics*
- *later prehistoric linear boundary features of probable Iron Age date that may be associated with a system of stock control.*

Detailed analysis of the pottery and lithic assemblages has provided information relating to the changing character and use of this site over millennia, whilst analysis of pollen and botanical macrofossils has shed light on the environmental history. Palaeoenvironmental

evidence suggests that during the Bronze Age the site was part of a riparian landscape with stands of deciduous trees and pools of standing water in which both arable agriculture and herding of domestic animals took place. A comprehensive programme of radiocarbon dating has helped unravel the chronology and one of the more interesting outcomes has been that the Early Bronze Age funerary remains appear to be contemporary with adjacent structural remains which could relate to contemporary settlement or perhaps to funerary practice.

Data collected during this study, together with that from sites in the surrounding landscape, offer a significant opportunity for telling the story of early settlement and land use in the Trent Valley.

INTRODUCTION

The Mercia Marina site is located on Findern Lane *c.* 500m north-east of the village of Willington, Derbyshire (Fig. 1). The southern area of the site (Area 1) is centred on SK 3027 2929 while the northern area investigated (Area 2) is centred on SK 3010 2959.

Area 1 was part of a large field given over to pasture between Findern Lane and the Trent and Mersey Canal. Area 2 (Plate 1) was on the east bank of a lake formed by drowning an earlier gravel quarry used as a fish pond prior to the development, but which has now been enlarged to form the new narrow boat Marina. This area was excluded from the original gravel extraction on account of archaeological sensitivity suggested by crop marks on aerial photographs and by evaluation trenching and excavation of the surrounding area in the mid to late 1990s (Hughes and Jones 2001).

Solid geology in this part of the Trent Valley is a complex mix of mudstones, sandstones and other sedimentary rocks, and the dominant drift geology is overlying fluvio-glacial sands and gravels (Knight and Howard 2004, 5-6). River valleys containing fluvio-glacial sands and gravels are traditional foci for human settlement being free-draining, fertile and typically situated above the floodplain proper.

Prior to excavation on the Mercia Marina site, it was known through aerial photograph and cropmark evidence, that there were surviving archaeological deposits. Various features could be recognised including a ring ditch and linear boundary features extending across Area 2.

The Mercia Marina site itself has been subject to archaeological investigation in the recent past. In the early to mid 1990s, this was undertaken prior to gravel extraction associated with construction of the Derby Southern Bypass (A50). Birmingham University Field Archaeology Unit (Hughes and Jones 1995; 2001) carried out the work which consisted of geophysical survey, evaluation trenching and targeted excavation. While the geophysical survey was largely indeterminate, evaluation trenching highlighted the existence of sub-surface archaeological deposits including a possible late-Neolithic/Early Bronze Age ring ditch (Ring Ditch 2 excavated during this work) and a pit containing probable Early Neolithic pottery (Hughes and Jones 2001, 4).

Following later permission to extract gravel, a full excavation was conducted within the affected area, in order to preserve by record all archaeological remains. A large volume of Neolithic pit features was recorded, 49 of which were dated by association with Early-Middle Neolithic pottery sherds, some dated by thermoluminescence to the mid 4th to early 3rd millennia cal. BC. Indeed 94% of the pottery sherds were from Early-Middle Neolithic vessels (Woodward and Hancocks 2001, 10). Key features of the site were seven discernible clusters

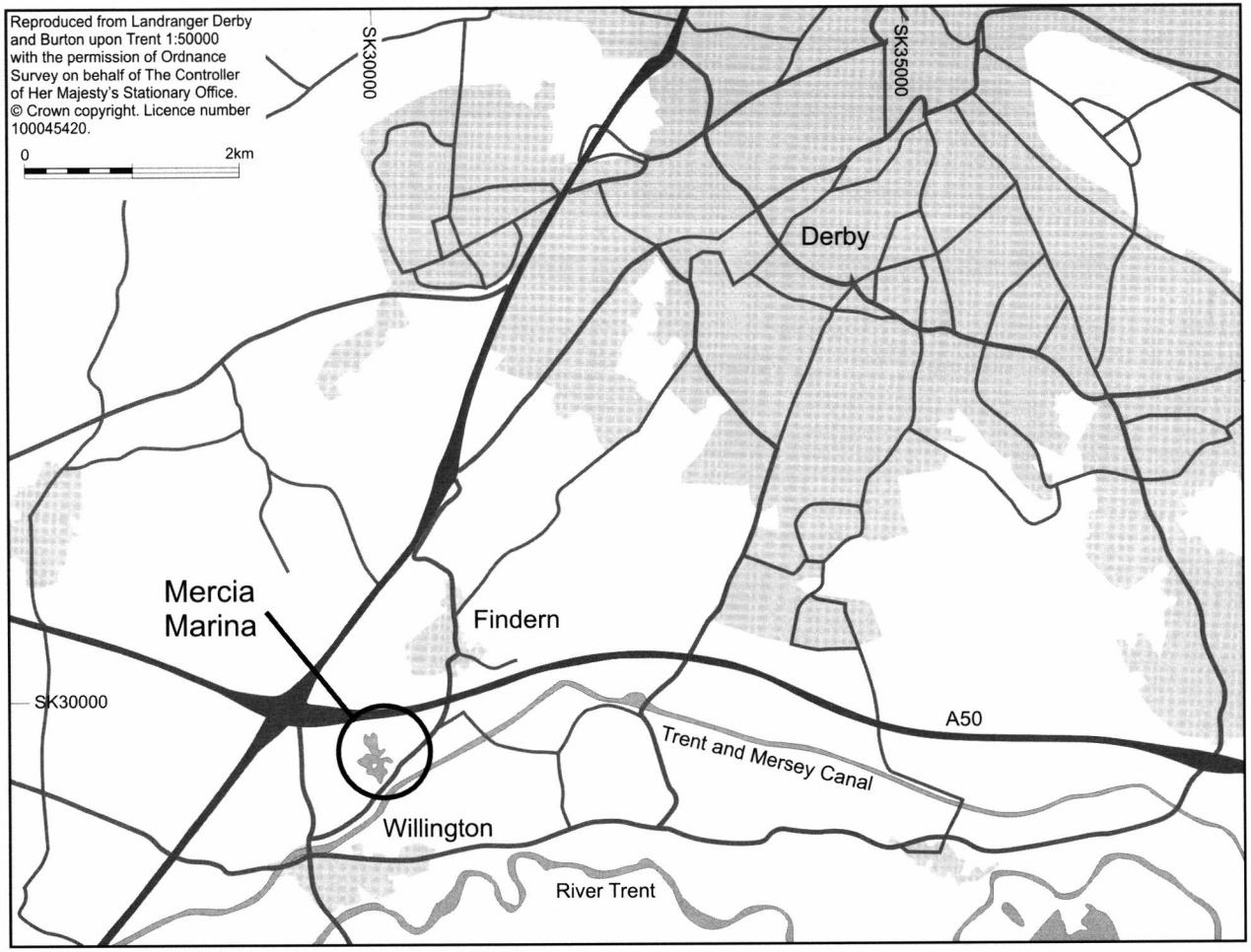


Fig. 1: Location of Mercia Marina

Plate 1: General view of Area 2 showing the expanse of sand and gravel substratum and the former gravel quarry beyond.

of Neolithic pits and two Early Bronze Age ring gullies or ditches (Hughes and Jones 2001, 6-9), one of which is the same monument as Ring Ditch 2, excavated as part of this work (see below). The only non-prehistoric element on the site was two sherds of residual early 1st millennium AD pottery (Hughes and Jones 2001, 9). Environmental sampling of some of the Neolithic pits also revealed evidence for cereal cultivation (wheat and barley seeds) and exploitation of wild plant foods as evidenced by abundant charred hazelnut shells (Monckton 2001, 14).

The area around Willington, in the middle Trent Valley, is known to be an archaeologically rich landscape and has been a focus for fieldwork through the last century. To the west of Willington, at Willington Quarry, excavations were conducted in advance of gravel extraction from 1970-72 (Wheeler 1979). The site yielded archaeological remains from the Early Neolithic through to the Early Medieval period, and included settlement evidence for the Early and Late Neolithic, Early Bronze Age 'barrows' or ring ditch funerary monuments, Iron Age roundhouses and linear boundary features, and Anglo-Saxon post-built and sunken-floored buildings *(ibid.* 1979). More recent excavations at the Willington Quarry site have revealed further prehistoric features, including pits, and two burnt mounds with Late Neolithic and Early Bronze Age dates (Beamish 2009).

Other sites within the immediate Willington area include the two cursus monuments known from aerial photographs and tested by excavation at Aston-upon-Trent (Elliott and Garton 1995; Gibson and Loveday 1989; Reaney 1968) and Potlock (Findern) to the south-east of the Mercia Marina site (Guilbert 1996; Wheeler 1970). Also a multi-period site at Swarkestone Lowes, known for its upstanding barrows (Posnansky 1955), has also yielded an occupation site contemporary with Beaker pottery and pre-dating a ring ditch (Greenfield 1960), and recent work here has revealed finds and remains from the Mesolithic through to the Romano-British period (Elliott and Knight 1999; Guilbert and Elliott 1999). The only known Scandinavian cremation cemetery in the British Isles lies nearby at Heath Wood, Ingleby, where excavations have suggested that it could house remains of the dead from the Great Army of AD 873-8 (Richards 2004). As well as a wealth of investigated sites on the Trent gravels, there are many sites known from aerial photographs which survive as cropmarks. Types of sites recognised in the mid Trent area around Willington include: ring ditches, pit alignments, linear boundaries, enclosures, and a droveway (data supplied by Derbyshire HER; also Knight and Howard 2004)

The archive report for the Mercia Marina excavations, which contains all tabulated feature and small find catalogues, can be downloaded from www.archaeologicalresearchservices.com.

EXCAVATION

Method

The excavations comprised three trenches in two separate areas (Fig. 2). The overburden was removed by machine under archaeological supervision then the three trenches were cleaned by hand and all archaeological features recorded in plan prior to excavation.

It was noted on site that the clarity and visibility of cut features in plan changed due to prevailing weather conditions and moisture content of the soil and that the greatest visibility was afforded not when wet or dry, but when the ground was undergoing change from one state to the other. The same occurrence was noted by Wheeler during excavations at Willington Quarry (1979, 69).

Each feature was half-sectioned to determine form and dimensions, and any artefacts and samples suitable for radiometric or environmental analysis were taken. The content of all deposits with potential for providing organic material was subject to flotation through graduated sieves (5mm, 2mm, 1mm, 500μm). After half-sectioning, each deposit was photographed, drawn and the feature plans were amended to account for the shape of the cut. Datum lines relating to each section were surveyed using a total station. The remaining halves of any features containing small finds or palaeobotanical evidence of a significant quality or quantity were removed, as were the remaining halves of any features which showed evidence for burning *in situ*. All the deposits and cuts were described on *pro forma* context sheets.

All artefacts were bagged individually and assigned a discrete number. Where finds did not come from a discrete context, they were recorded in three dimensions so their position could be plotted on the overall site plan. An overall site plan was made using a total station which allowed the trenches to be tied in to the Ordnance Survey National Grid and Ordnance Survey Datum.

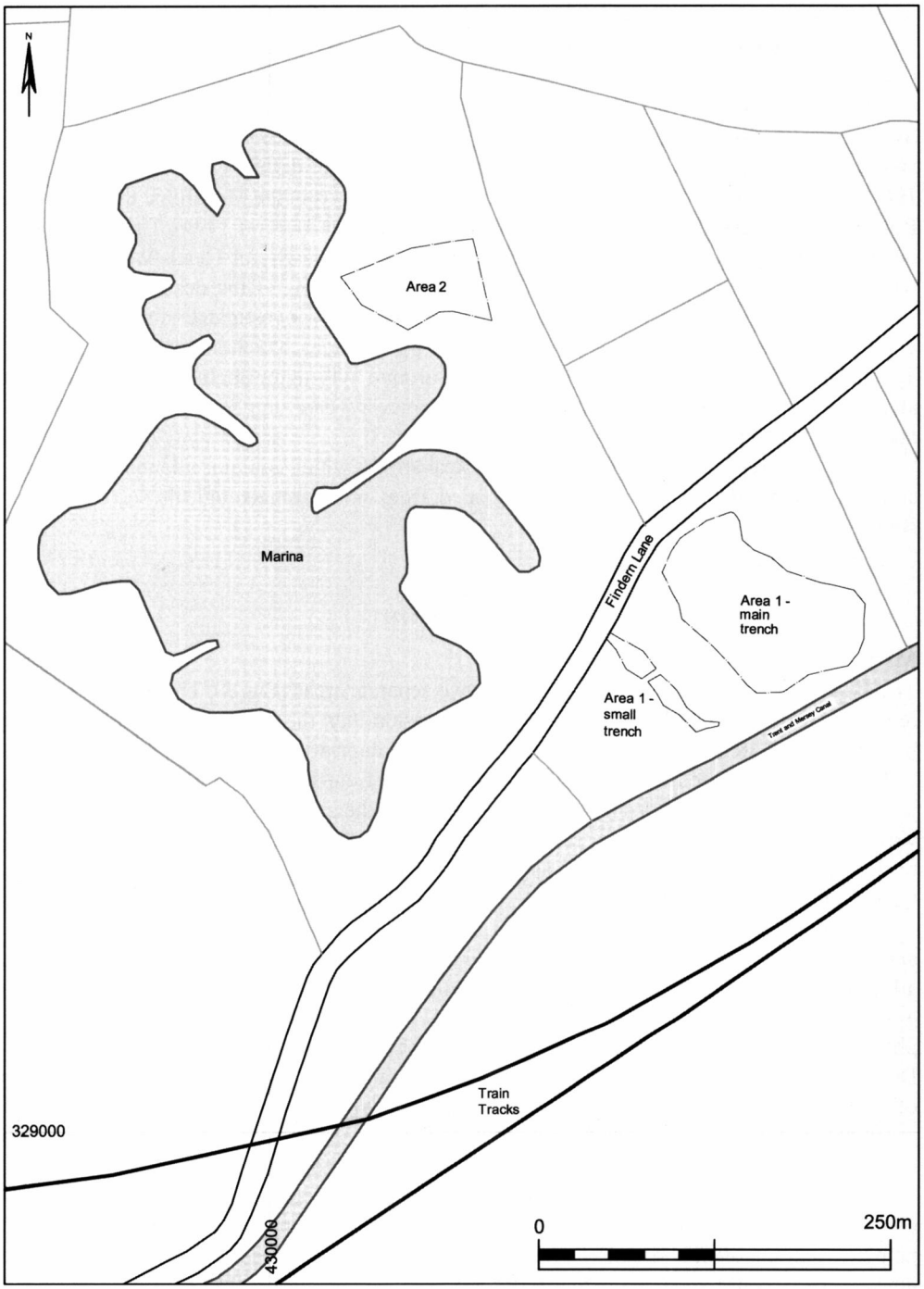


Fig. 2: Site plan showing location of the excavation trenches.

Area 1 (Trenches 1 and 1a)

Topsoil over the site was a thin loamy dark brown soil, which had probably been specially imported during the previous groundworks and reinstatement following gravel extraction. Fluvio-glacial sands and gravels was the principal underlying drift geology across the site was.

One immediately noticeable aspect of the site was its truncation by ploughing. After topsoil removal a large number of parallel plough marks were cut into the sand and gravel sub-stratum, some cutting into the tops of archaeological features.

As shown in the plan of Area 1 (Fig. 3), a large portion in the south of the trench became inaccessible during the stripping process due to waterlogging. In concert with the Development Control Officer for Derbyshire County Council a decision was made to 'write off' the inaccessible portion of the site, and a further area was identified where rapid recording and finds retrieval could be attempted if conditions improved. Ultimately due to the high water table and waterlogged conditions on this site full recording was only possible in the northern portion of the site and it is features in this area that are summarised and discussed below (the full details are in the archive).

Pit alignment and associated linear ditch feature

The pit alignment ran east-west across Area 1 and the similarity of form of individual pits indicated that they formed part of the same planned structure (Figs 3 and 4). Clear association between the pit alignment and the linear boundary feature F027, suggesting their contemporary use, is indicated by the pit alignment's termination at a break in F027. However, it is possible that one may have been built after the other went out of use but this could not be tested as no suitable dating samples were retrieved, nor small finds, despite sieving feature fills, and there was no stratigraphic phasing between the features.

Pit Features

Other pit features encountered and excavated in Area One were spread across the northern part of the trench and, with the exception of pit F003, contained no small finds (Figs 5 and 6). Pit F003 contained a large volume of Bronze Age Deverel-Rimbury Ware pottery (Ceramics report below). Two radiocarbon measurements from [F003], are statistically consistent (T'=0.3; ν=1; T'(5%)=3.8; Ward and Wilson 1978) and therefore could be of the same actual age. The best estimate for the pit's date is provided by NZA-30342; 1690-1520 cal BC (Scientific dating section below).

Linear ditch and associated pit feature

F031, a section of a continuous ditch, could be part of a rectilinear enclosure or perhaps part of the ditch system represented by the pit alignment and linear ditch F027 (Figs 3 and 7). In profile the ditch's interior slope was gradual while the external slope was steep and had a hint of irregular sockets cut into it which may indicate some form of fencing. This possibility of the linear ditch having contained a timber fence is supported by the observation that the excavated ditch section terminated at a posthole. Pit F073 was closely associated with ditch feature F031 and contained pottery sherds most likely dating to the Iron Age (Ceramics report below).

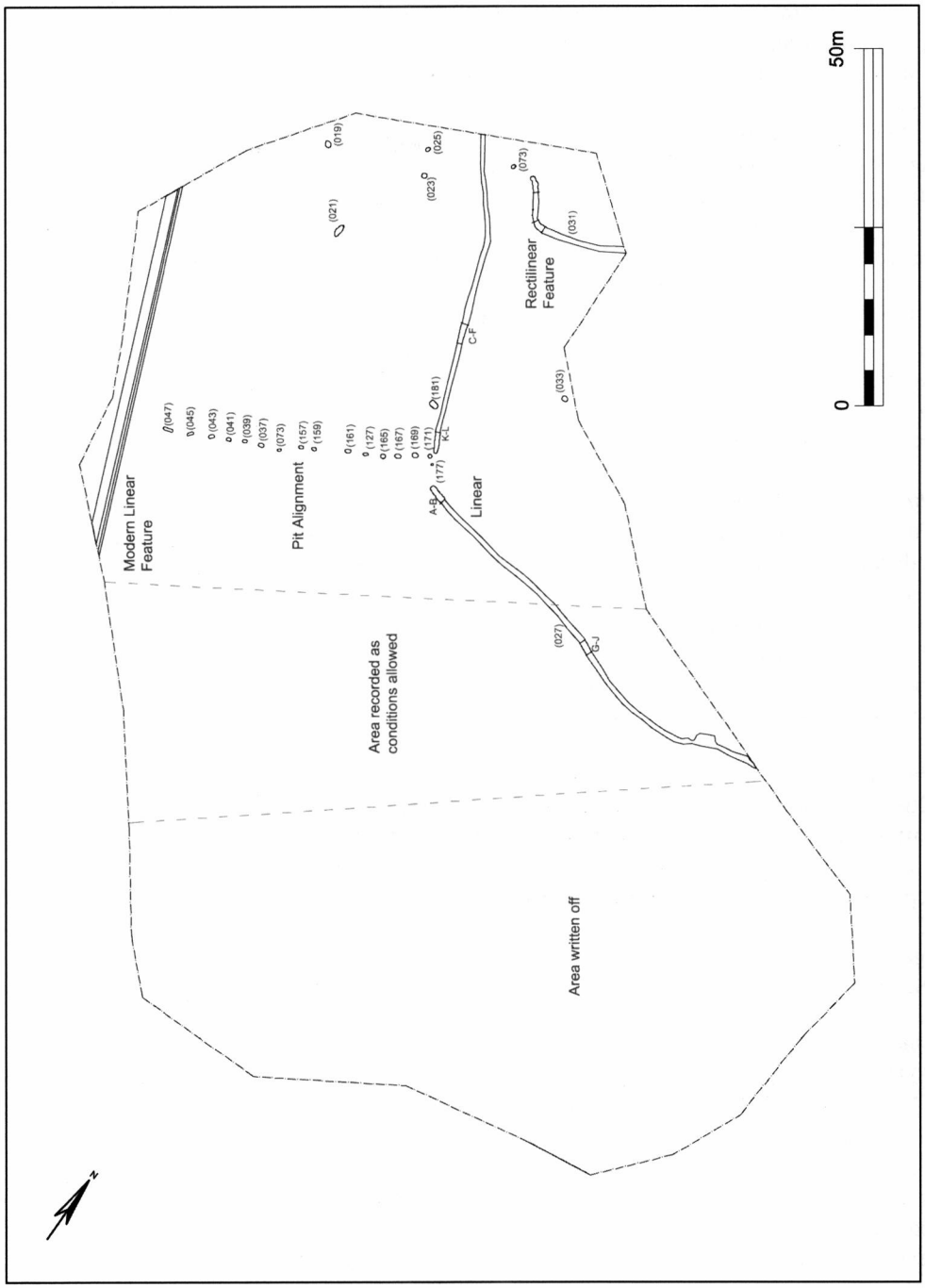


Fig. 3: Plan of Area 1 main trench.

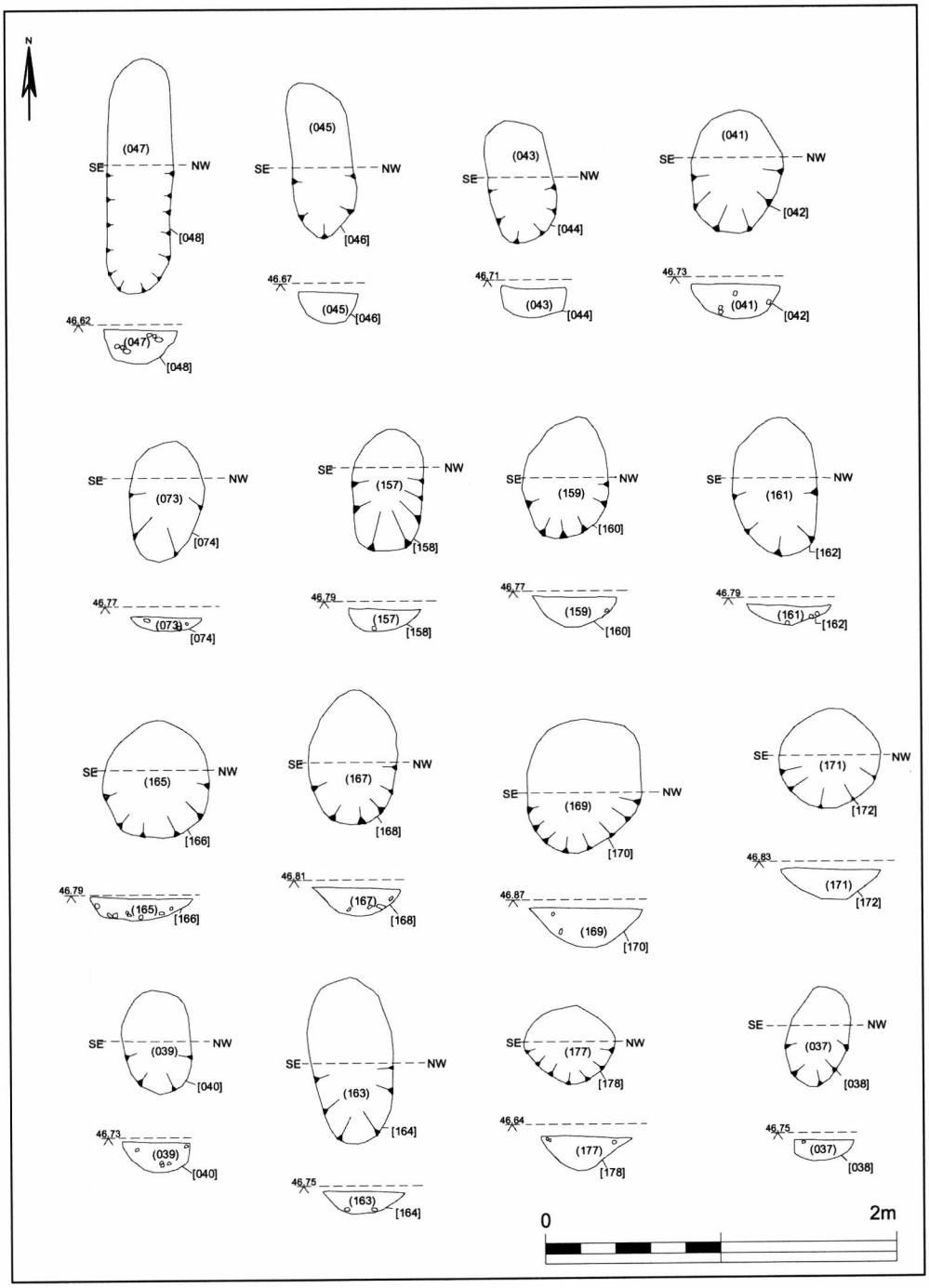


Fig. 4: Sections of features within Area 1 Pit Alignment.

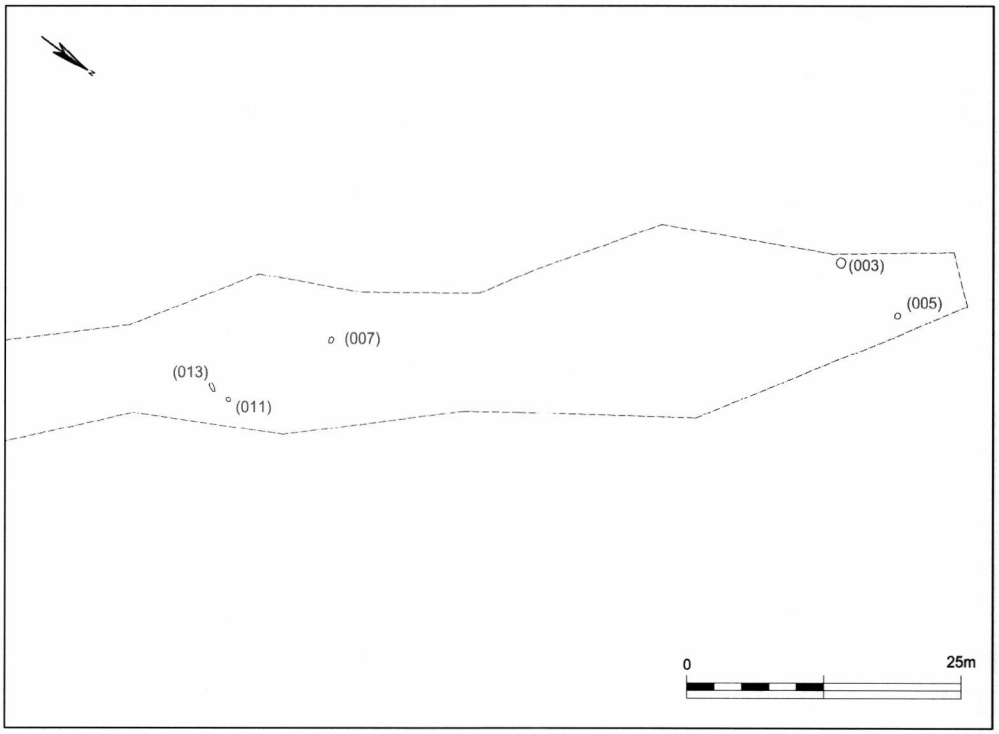


Fig. 5: Plan of Area 1 smaller trench.

Area 2

All features within Area 2 were truncated with no intact archaeological deposits surviving within the topsoil (Fig. 8). The start of the archaeological horizon coincided with the start of the sand and gravel substratum. A number of features occurred as clusters, mainly as groups of pits or postholes, some associated with a large ring ditch (Ring Ditch 2) and a penannular ditch (Ring Ditch 1). The features are discussed in chronological order, followed by all the other features which yielded neither a scientific date on charred samples nor diagnostic artifacts.

Mesolithic

Large Pit F1063

Feature F1063 appeared as a large oval pit in plan, with what appeared to be a homogenous dark brown fill. The pit was excavated in quarters to provide a clear understanding of the complex stratigraphic sequence of deposition, and also to ascertain the relative dates of the pit and the linear ditch which runs across it (Fig. 9; Plate 2). The stratigraphic sequence is open to a number of interpretations, with the following being the best fit recognised by the site director (JB). Firstly a large, reasonably steep-sided, pit appears to have been created most probably as a tree-throw that subsequently may have been anthropogenically enlarged. A second event was the partial filling of this pit with a sandy clay deposit (1264). This primary

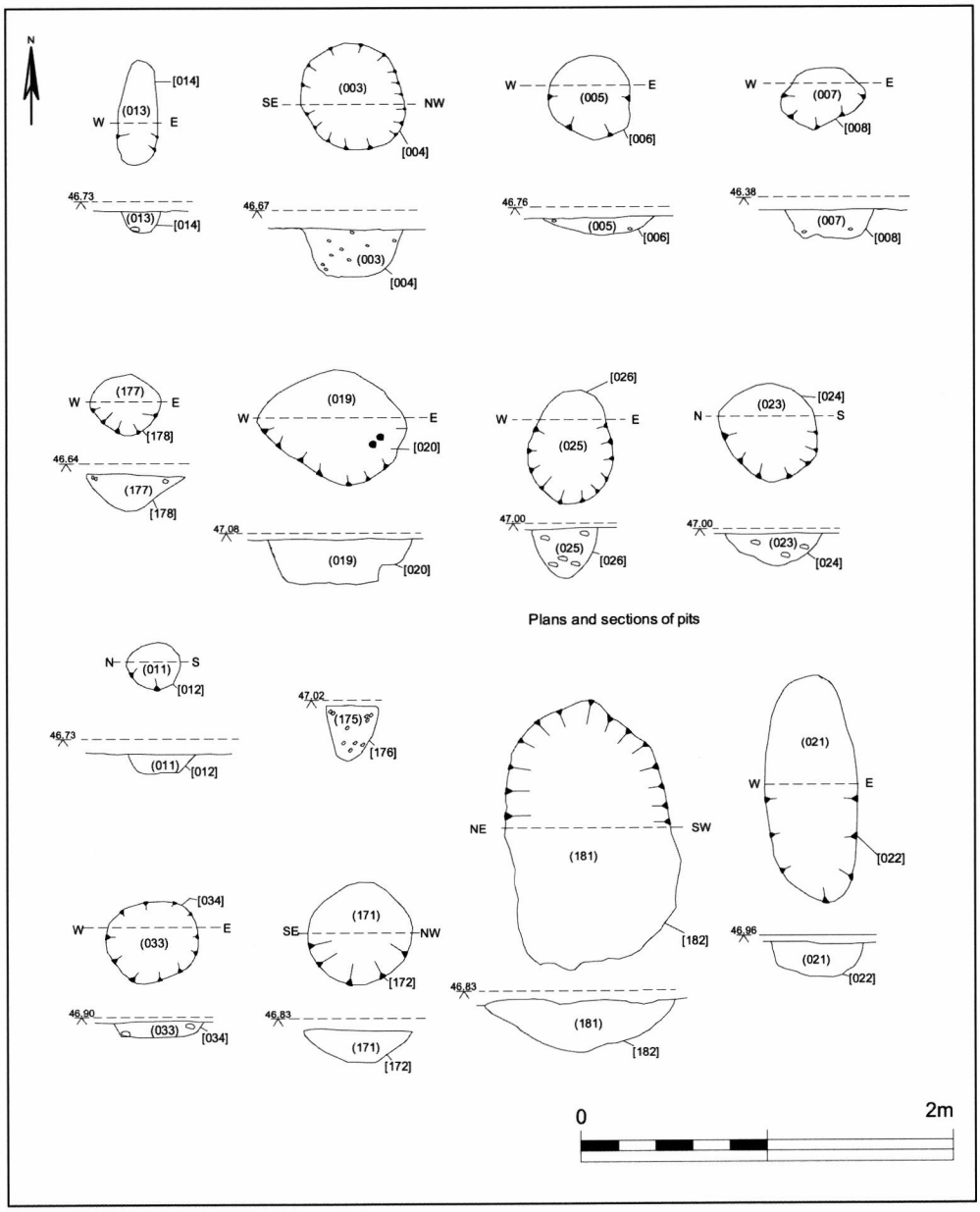


Fig. 6: Sections of other features within Area 1.

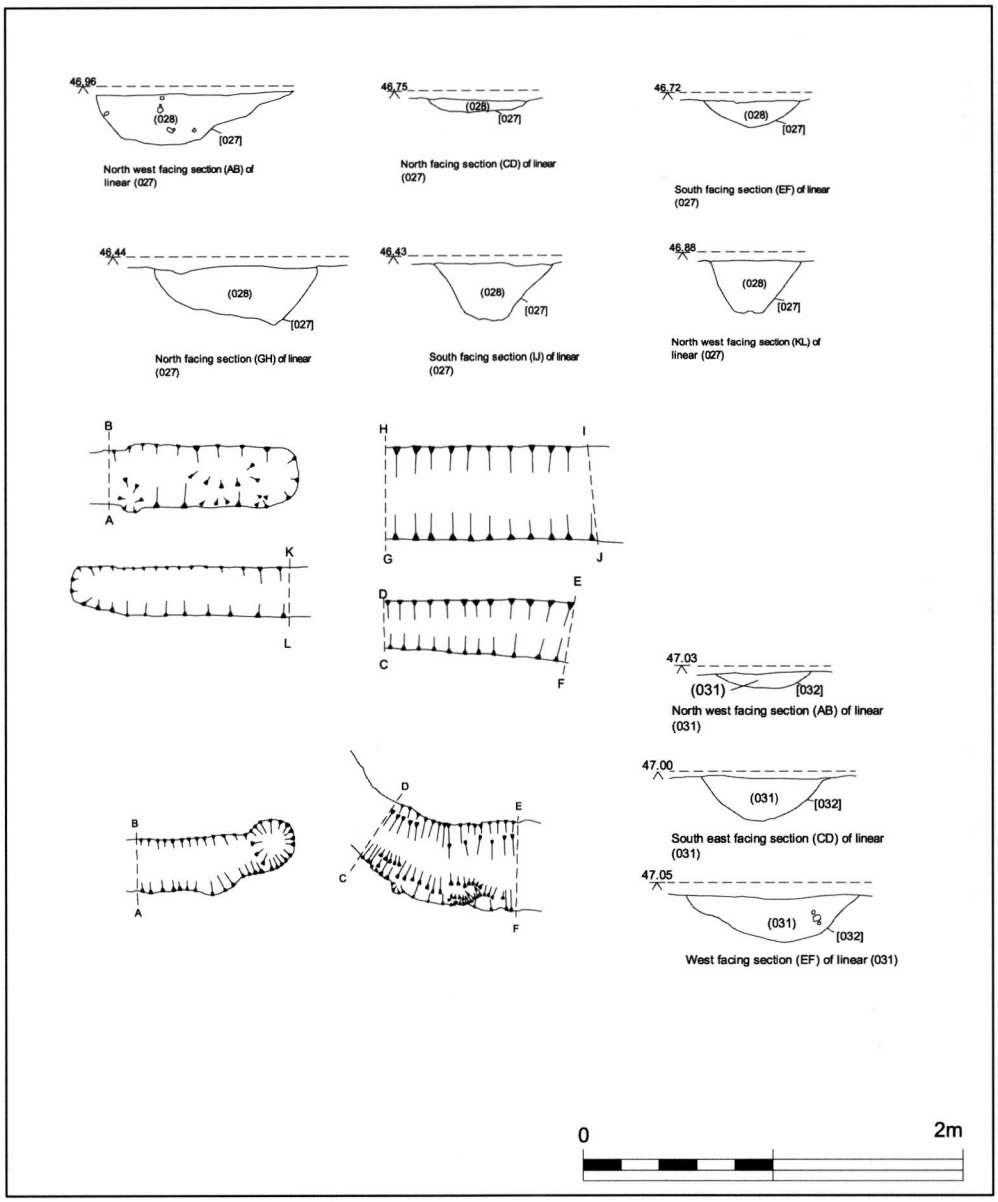


Fig. 7: Sections of other features within Area 1.

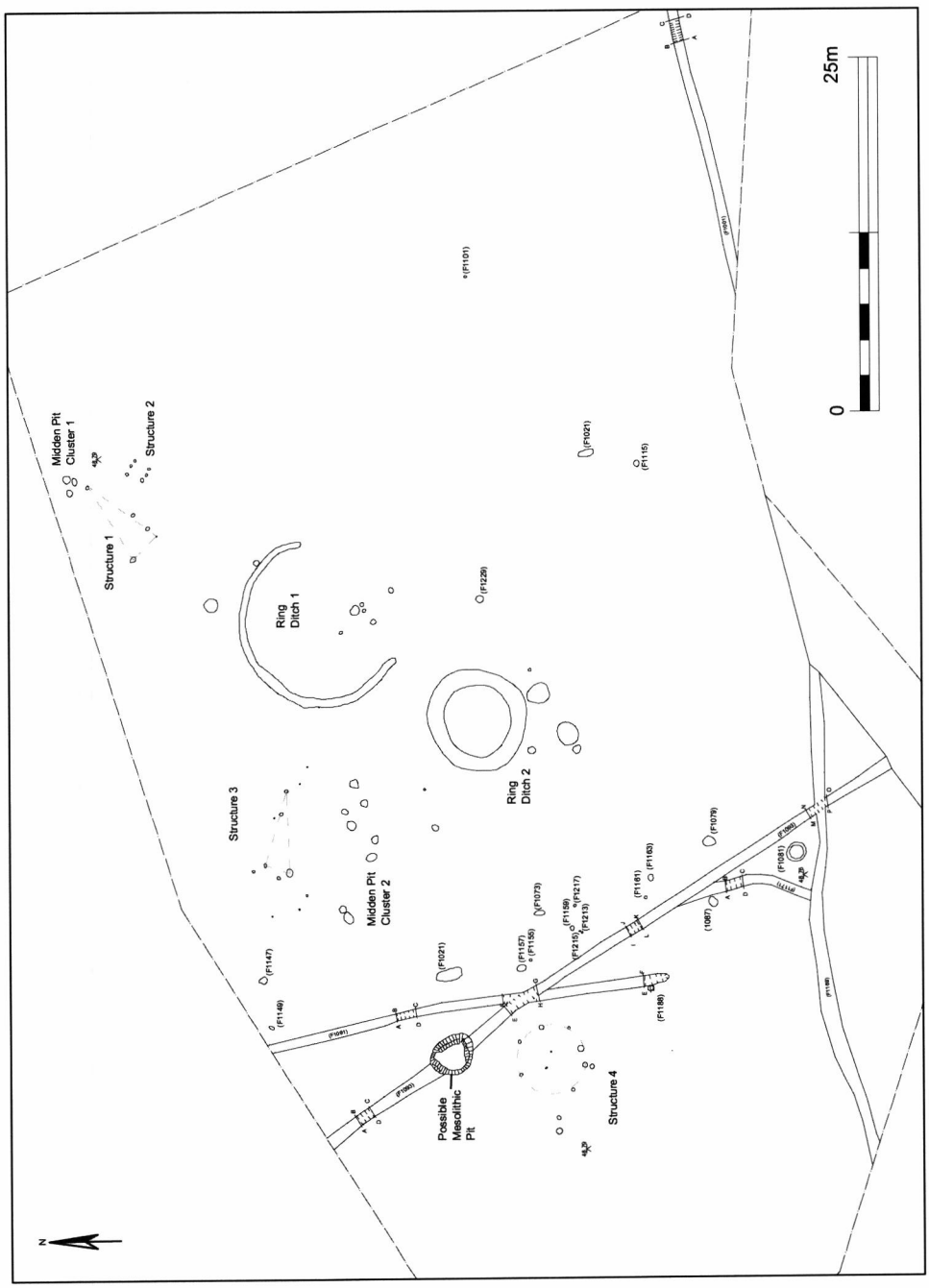


Fig. 8: Plan of Area 2

fill was only located in the centre and western edge of the pit, but elsewhere appeared to have been truncated by later deposits, and may represent some form of lining. Following this a series of deposits filled the pit which on first inspection seem to represent natural slumping and silting, but there may also be an anthropogenic element, as some contained worked stone tools of Mesolithic date. The upper deposits of the stratigraphic sequence in the western quadrant contained a large amount of wood. This wood does not appear to have been worked and most likely represents the root system of a beech tree, probably the original tree which created the pit. Linear ditch feature F1169 (see below) cuts pit F1063 and is therefore chronologically later.

Neolithic

Neolithic features on the site were Midden Pit Clusters 1 and 2 and three outlying pit features containing Neolithic pottery.

Midden Pit Cluster 1

Three pit features in Midden Pit Cluster 1 lay close against the trench edge towards the northern corner of the trench and close to Structures 1 and 2 (Figs 10 and 12). Two of the pits contained Early Neolithic ceramics and charred material and together these pits can be characterised as typical midden pits, usually taken to indicate the presence of Neolithic settlement. Radiocarbon date NZA-30287 from pit F1285 provides the best estimate of date at 3640-3370 cal BC.

Midden Pit Cluster 2

Midden Pit Cluster 2 represents the largest concentration of features producing small finds in Area 2 (Figs 11 and 12). Of the seven midden pits excavated, six produced Carinated Bowl pottery, usually in significant quantities, and three of the pits (F1079, F1219, F1281) also contained diagnostic Neolithic flint tools (two end scrapers and a retouched blade). All the pits were of medium size (between 400mm and 890mm in diameter) and contained similar, though not identical fills.

Other Pit Features (Fig. 12)

In the immediate vicinity of Ring Ditch 2 there were two pits containing prehistoric pottery sherds. Pit F1077 contained fragments of what is probably Early Neolithic Carinated Bowl pottery, while Pit F1193 contained the remains of at least five highly-decorated Late Neolithic Impressed Ware vessels, the only feature on site containing this type of ceramic. F1021 was an isolated pit feature which contained some fragments of Early Neolithic Carinated Bowl.

Botanical and pollen evidence from the Early Neolithic midden pits show that arable agriculture was being practiced with wheat and barley grown alongside the animal grazing. Pollen indicates that this was in a largely open landscape with stands of trees and standing water (Pollen assessment below).

Bronze Age

Structures 1-4

Structure 1 was a post-built structure comprising four postholes (F1269, F1273, F1277 and F1283) and one stakehole (F1271) (Figs 10 and 13). In plan the structure formed an isosceles triangle with the long sides measuring 6m maximum length and 2.4m the maximum

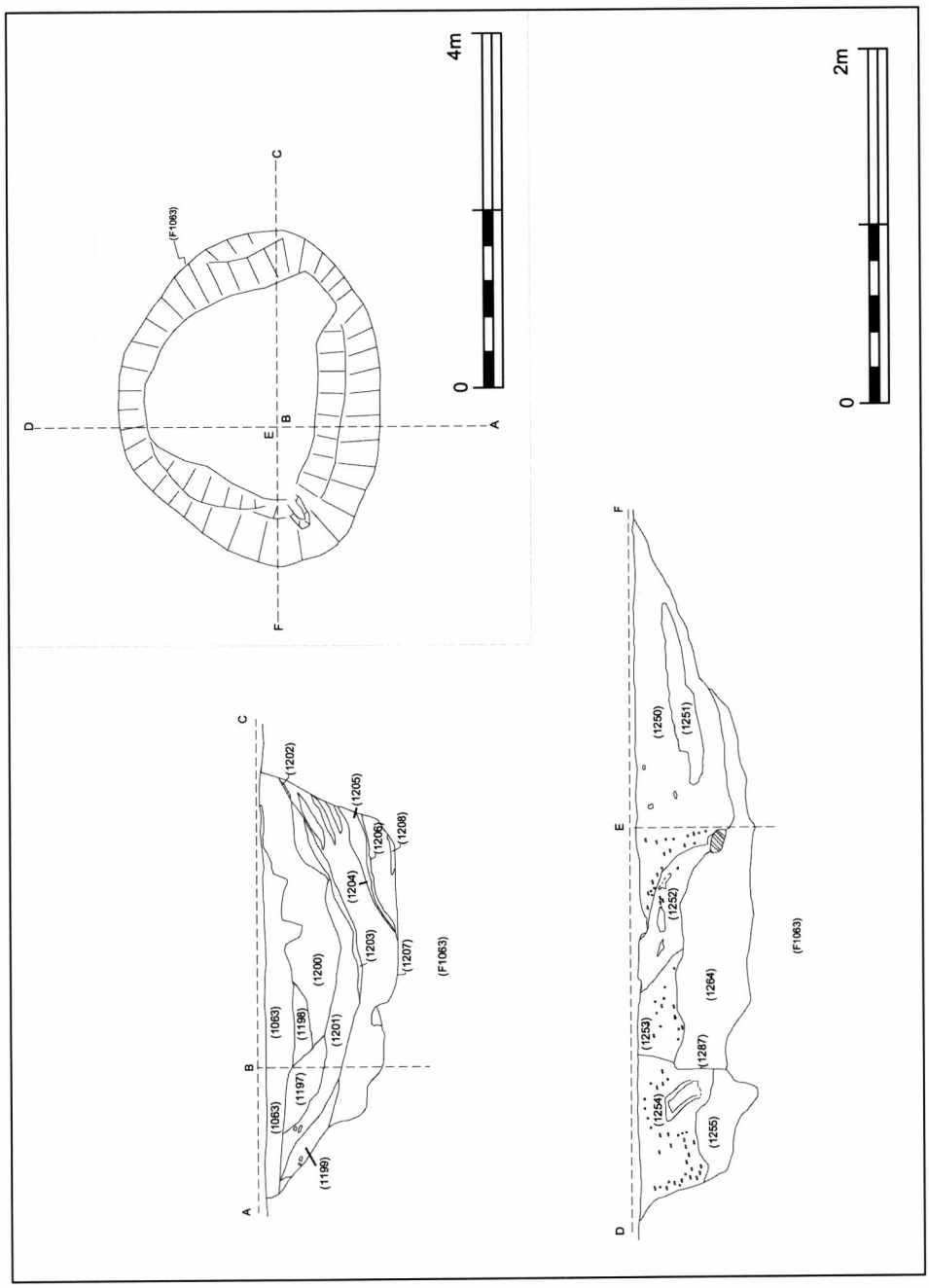


Fig. 9: Plan and section of possible Mesolithic tree-throw pit.

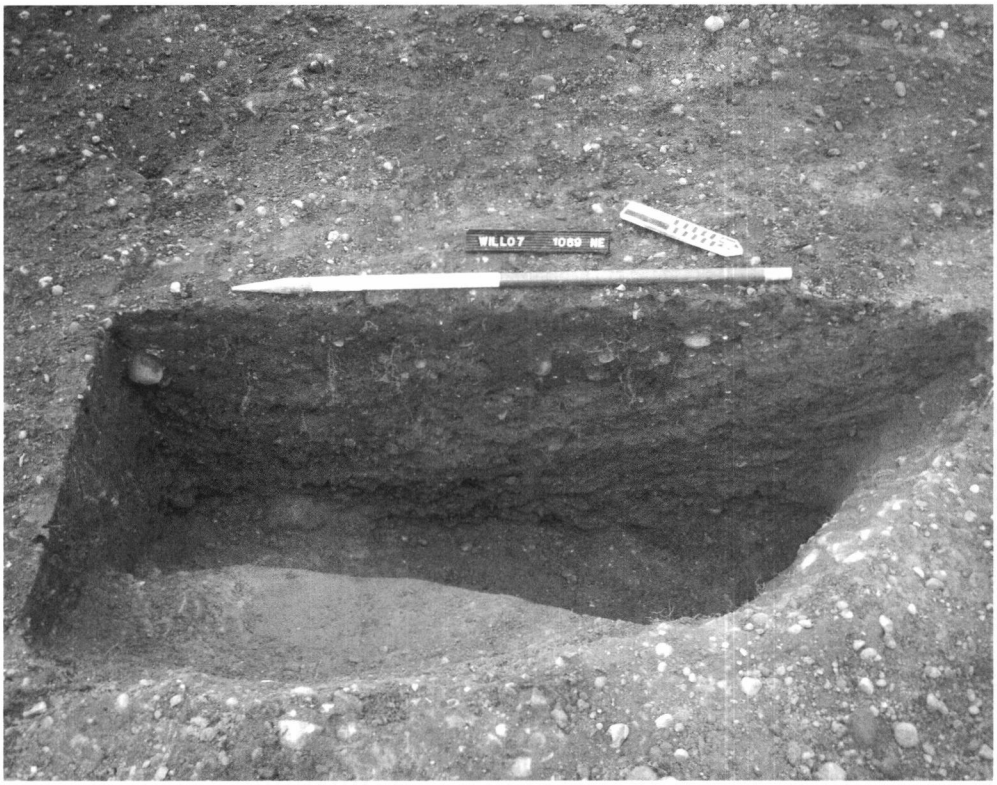


Plate 2: Section of possible Mesolithic tree-throw pit showing depositional sequence of silting and slumping layers.

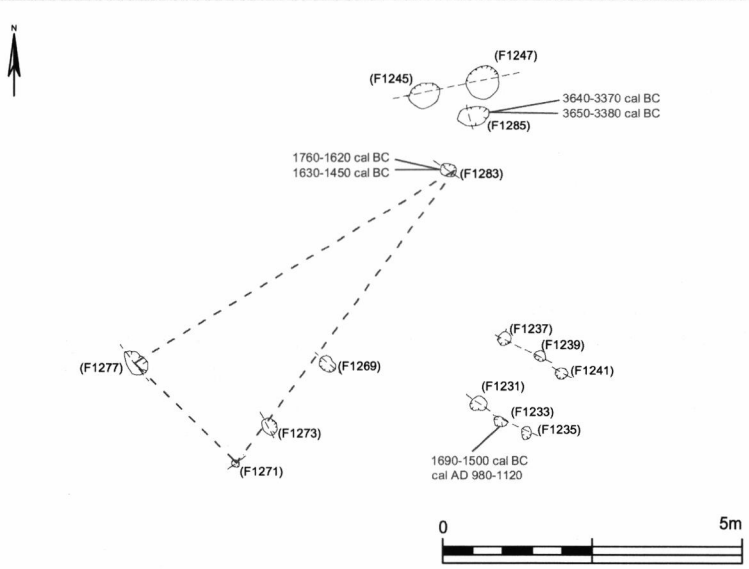


Fig. 10: Plan of Midden Pit Cluster 1 and Structures 1 and 2.

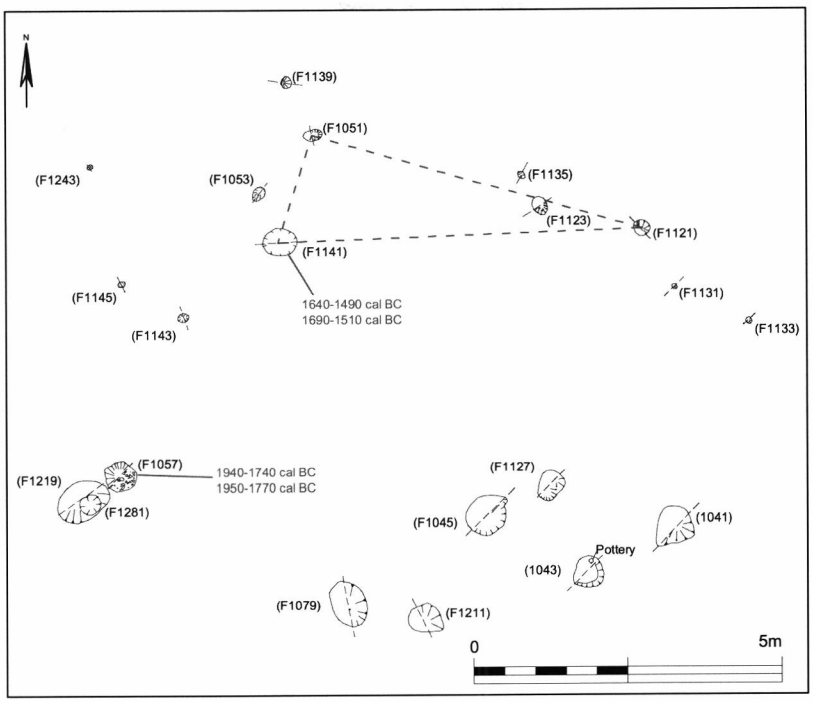


Fig. 11: Plan of Midden Pit Cluster 2 and Structure 3.

width. Structurally it is very similar in form and scale to a number of triangular post-built structures observed on recent excavations in Northumberland (Waddington and Davies 2002; Waddington 2006; Stafford 2007), which appear to have a long currency of use from the Early Neolithic through to the Early Bronze Age. The best date estimate for posthole F1283 is *1630-1490 cal BC* (*95% probability; NZA-30284*).

Structure 2 comprised three sets of opposed postholes forming a rough square each side approximately 1.2m long (Figs 10 and 13). The six postholes were all shallow and extremely truncated with an average depth of *c.*75mm. While it may appear that postholes of this size could not support any substantial arrangement of posts, the fact that these deposits cut into the substratum indicates they were originally more deeply set. Two charred samples from posthole F1231 were submitted for radiocarbon dating. One sample is clearly residual (NZA-30279) cal AD 980-1120, but the other provides an estimated date of *1680-1510 cal BC* (*95% probability; NZA-30300*), which means it could have been in use at the same time as Structure 1.

Structure 3 comprised of four larger postholes forming an isosceles triangle like Structure 1, with up to nine smaller postholes and stakeholes spread around it (Figs 11 and 14). The central triangular arrangement of postholes had a maximum length of 5.6m and a maximum width of 1.8m, making it close in form and size to Structure 1. Two radiocarbon dates obtained on samples taken from posthole F1141, *NZA-30289* provide an estimated date of *1640-1490 cal BC* (*95% probability*).

Structure 4 comprised 12 postholes and stakeholes, eight of which form the outer ring of a post-built circular structure measuring *c.*5m in diameter (Figs 14 and 15). Posthole F1180 is *positioned c.* 1.5m outside the ring to the west next to feature F1191, which may represent a

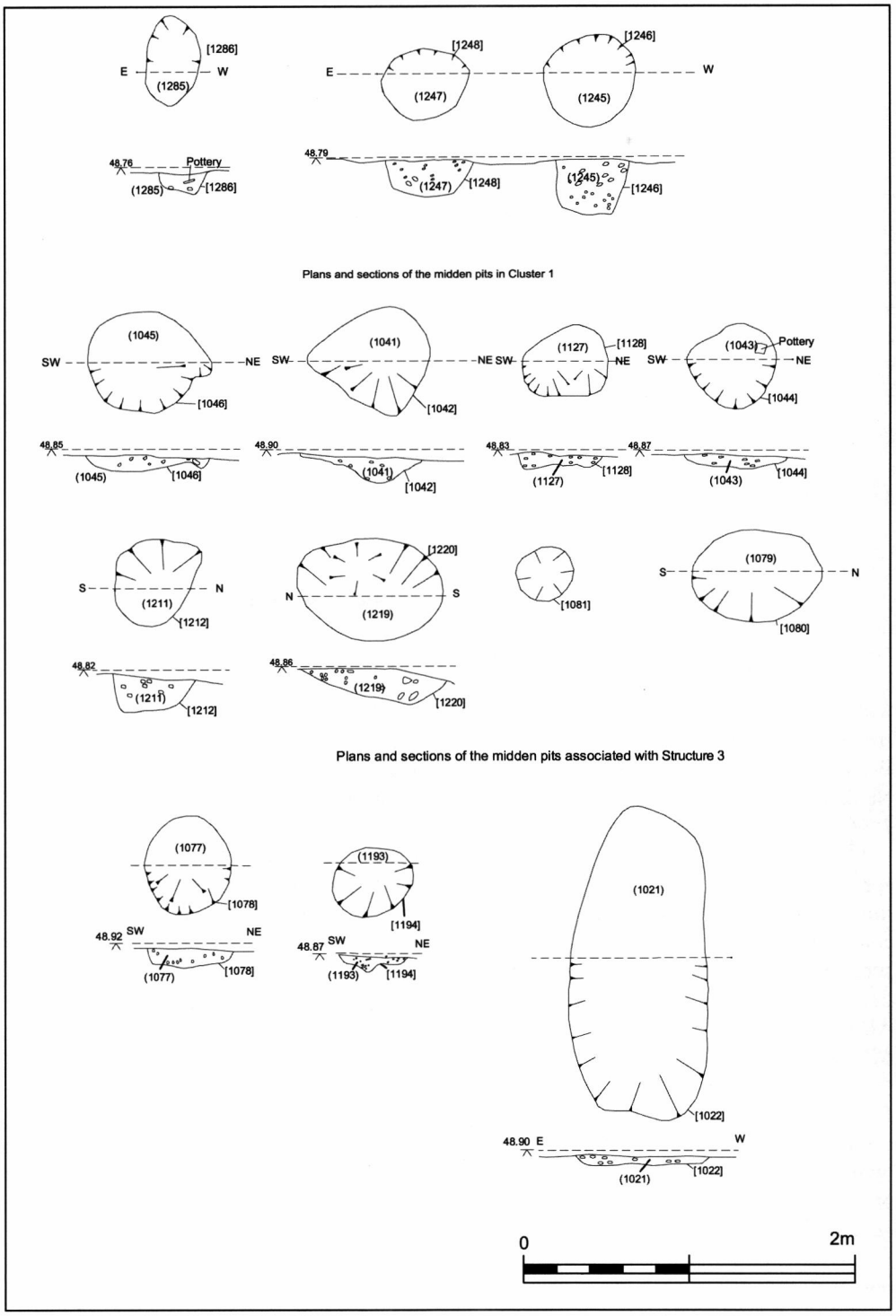


Fig. 12: Sections of Neolithic features.

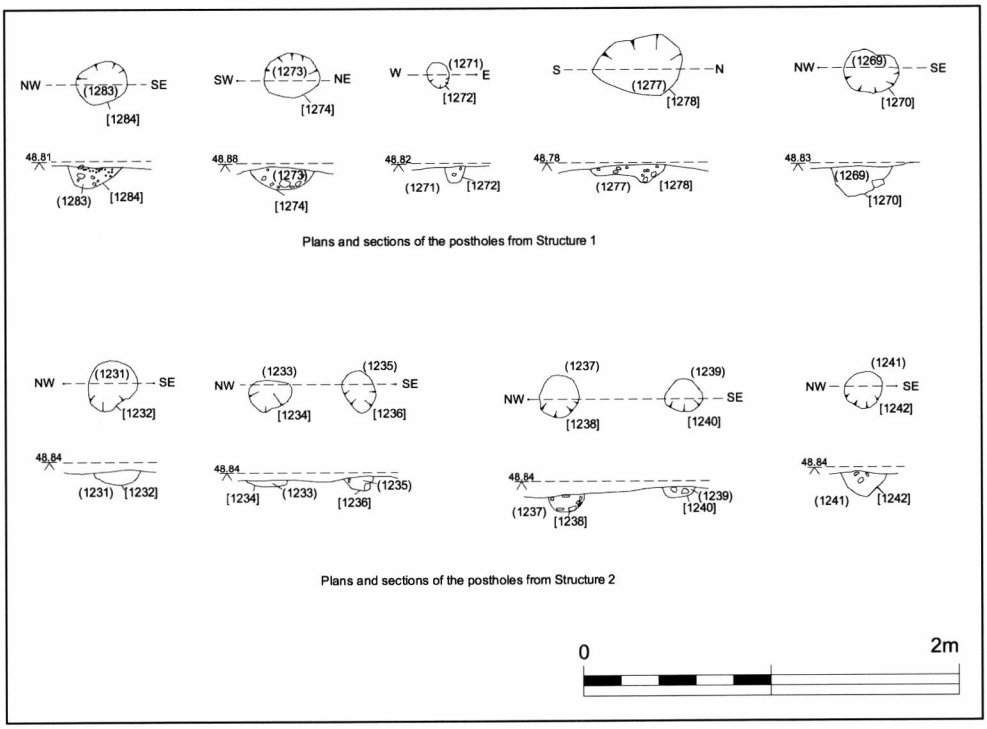


Fig. 13: Sections of features within Structures 1 and 2.

shallow pit or substantial round-based posthole. Two stakeholes (F1176 and F1178) positioned in the centre of the circular structure may represent some form of narrow central upright. Postholes F1067 and F1174 lie next to each other within the outer ring and could represent either a double posthole, for example at the entrance to the structure, or replacement of a post, indicating repair and reuse of the structure over a period of time. No small finds were recovered from the postholes themselves, although prehistoric pottery and lithics were found in pit/posthole feature F1191. Two radiocarbon dates were obtained on samples taken from the fill of posthole F1182; *NZA-30349* provides the best estimated date of *1610-1440 cal BC* (*95% probability*), indicating another building dating of Early Bronze Age date.

Cremation pits and Ring Ditch 1 (penannular)

During cleaning of the site a penannular ring ditch (Ring Ditch 1) was observed with a number of pit/posthole features in the centre of the open side (Figs 16 and 17). Ring Ditch 1 measured 11.7m in diameter at its widest point with a 10m wide opening to the south-east. The ditch was generally narrow and had an average depth of *c.*300mm. There were two distinct fills within F1111, (1111) and (1166). Deposit (1111) was the upper, secondary fill and was a sandy silt with a large volume of gravel inclusions. The primary fill of the ditch (1166) was a darker, siltier fill, with fewer inclusions. No small finds were recovered from the primary fill, though some lithics were found in the upper, secondary fill.

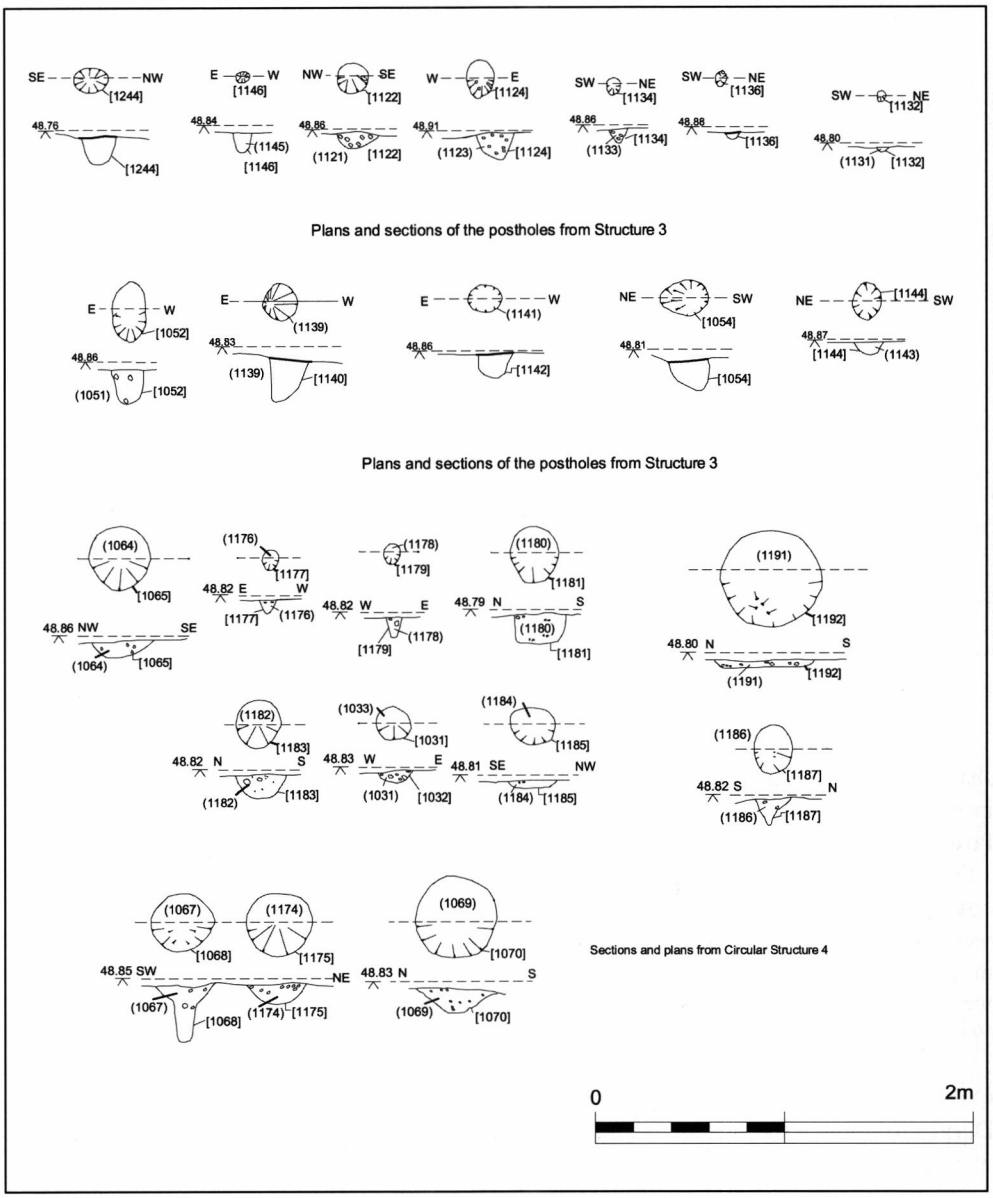


Fig 14: Sections of features within Structures 3 and 4.

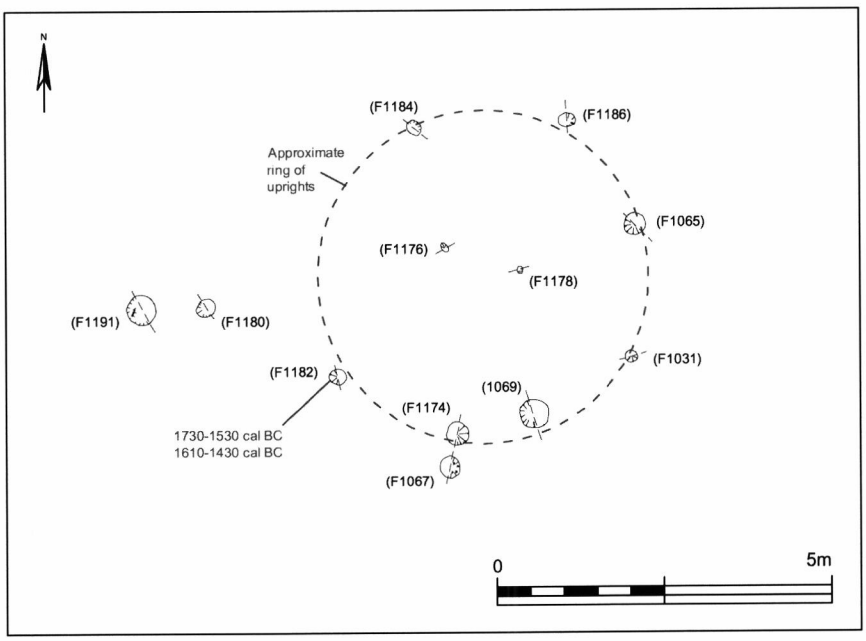


Fig 15: Plan of Structure 4

Within the opening of Ring Ditch 1 was a cremation pit (F1113) that had three phases of use. During the first phase a pit was dug and a ceramic vessel (pot 2) inserted, and fragmentary remains of burnt bone were found throughout the primary pit fill. At some time afterwards the pit was re-opened and another vessel (pot 78) (Plate 4), containing a cremation, was inserted. This vessel survived to a height of approximately 100mm with a large amount of burnt bone and sherds from the body of the pot set within a mixed silty upper fill (1165) (Osteological Analysis below). This cremation vessel is of an Early Bronze Age date although the ceramics from this pit show affinities with Late Neolithic Grooved Wares. A further Early Bronze Age cremation vessel, now fragmentary (Pot 1 in Ceramics Report below), was latterly inserted into the pit giving this burial pit a complex and protracted biography. A second pit containing cremated remains (F1109), 2.4m south-east of F1113, was a much smaller feature. A small amount of burnt human bone was recovered from this feature along with fragments of Early Bronze Age pottery. This feature also contained botanical remains of charred wheat and charred hazelnut shells which may represent some form of votive offering or deposition. Both of these features were heavily truncated, with modern plough marks running through the deposits.

Between the two cremation pits were three postholes (F1103; F1105; F1107). Two were of almost identical dimensions and lay adjacent to the main cremation pit (F1113), and the third was slightly larger and lay *c.* 1m to the south-west, towards the south-western terminal of Ring Ditch 1. While no small finds were recovered from the postholes, their proximity to the other features in this group, and their position within the opening of Ring Ditch 1, suggests that they are related to one of the phases of activity represented by the burial pits.

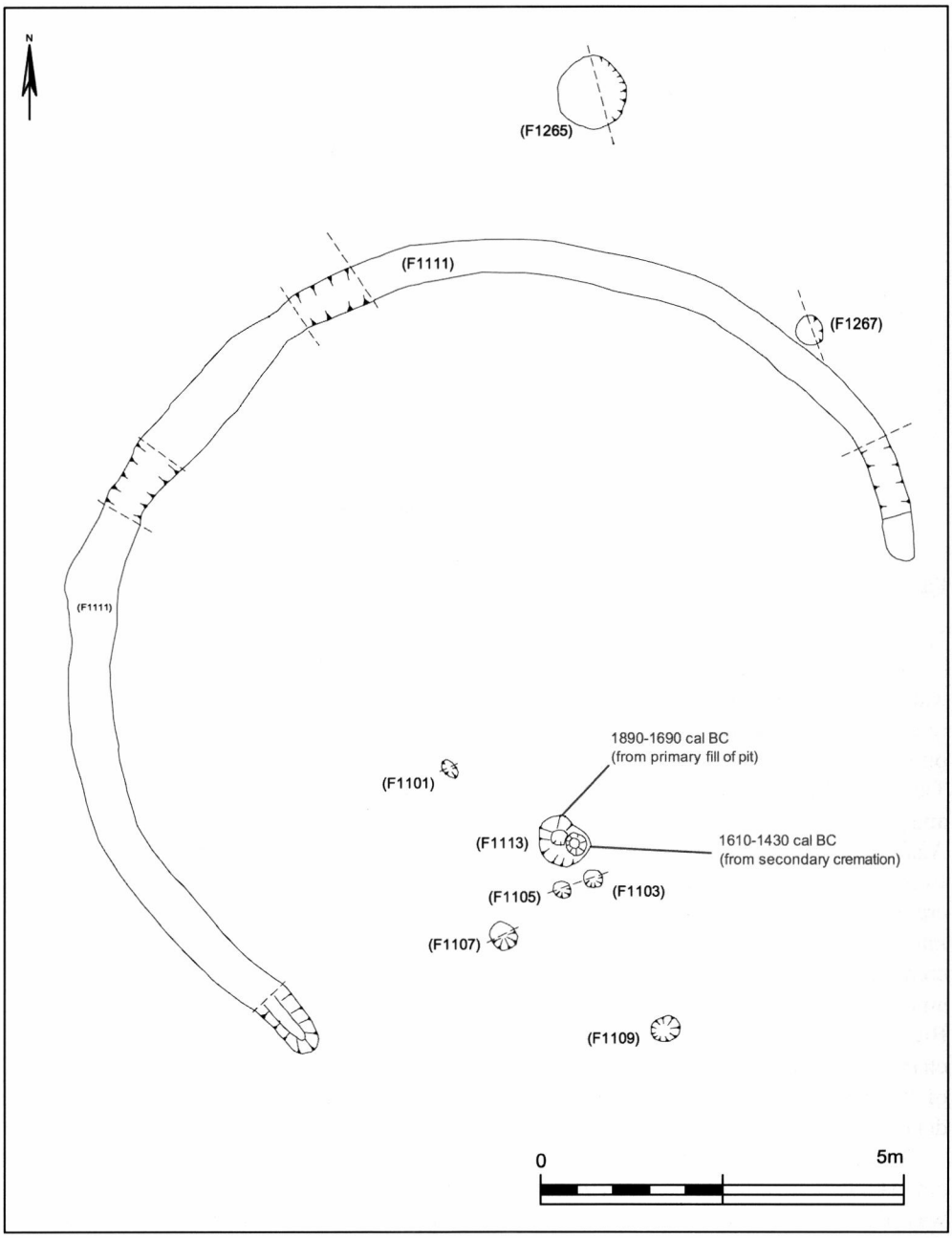


Fig 16: Plan of Ring Ditch 1 and associated features.

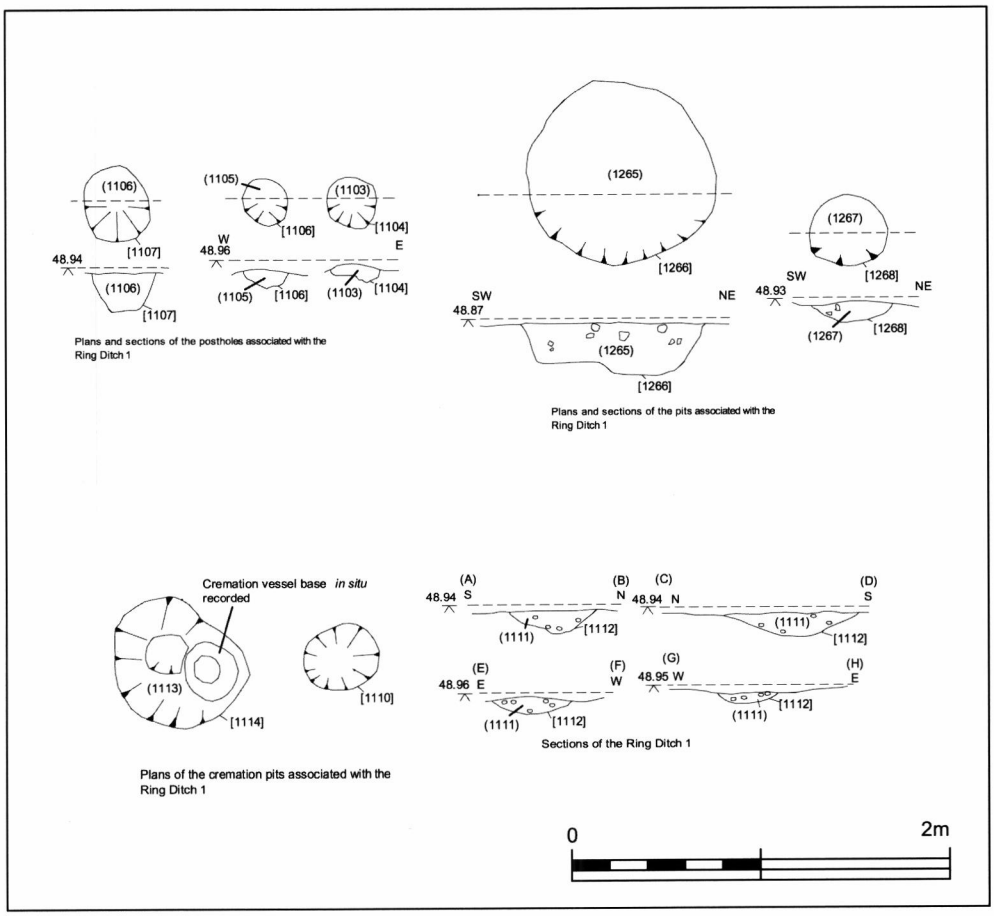


Fig 17: Sections of Ring Ditch 1 and associated features.

Two final features in this group are larger pits (F1265 and F1267) which lay outside Ring Ditch 1 to the north. It was originally suspected that the proximity of these features to the ditch indicated they were related, however no datable material was retrieved from these pits and it is unclear whether they have any relationship to other features in this group.

Ring Ditch 2 and associated features

The principal feature in this group was the large, roughly circular ring ditch (Ring Ditch 2) (Figs 18 and 19; Plate 3). It had a maximum external diameter of *c.*7.3m and a maximum ditch width of *c.*1.2m. The ditch fill comprised three separate deposits, which appear to represent three separate phases of cutting and deposition, indicating periods of use and re-modelling throughout the feature's history. The primary ditch cut [1260] was trapezoidal in section with straight sides and a flat base and the fill was the natural orange-brown sandy gravel (1261). A smaller ditch, also trapezoidal in profile, was cut into the infilled ditch, which varied in width between 600-850mm. This was filled with a distinctive grey clay deposit (1262) which appears markedly different to all the other deposits on the site and probably represents some purposely imported material. The final phase of re-cutting cuts both these previous deposits.

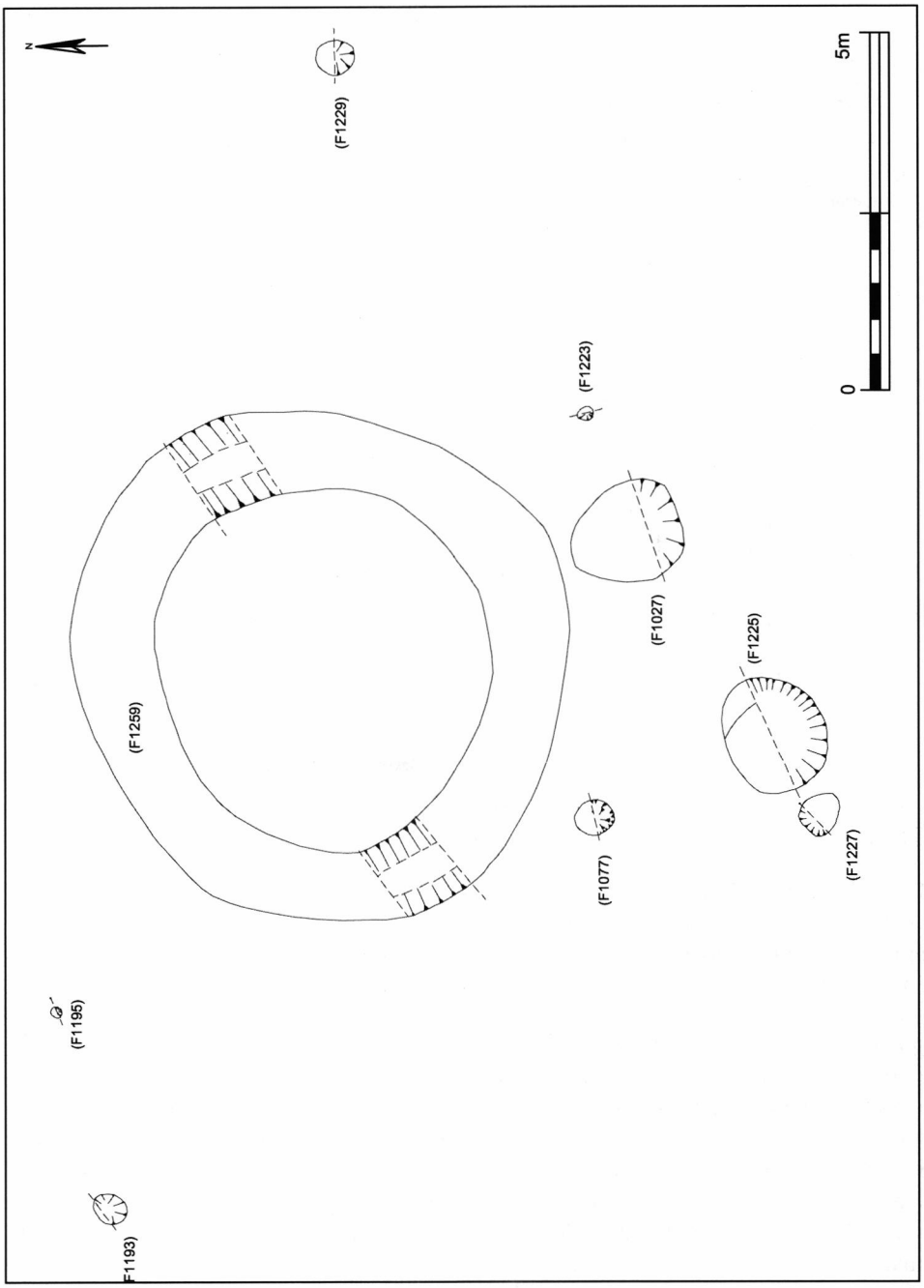


Fig 18: Plan of Ring Ditch 2 and associated features.

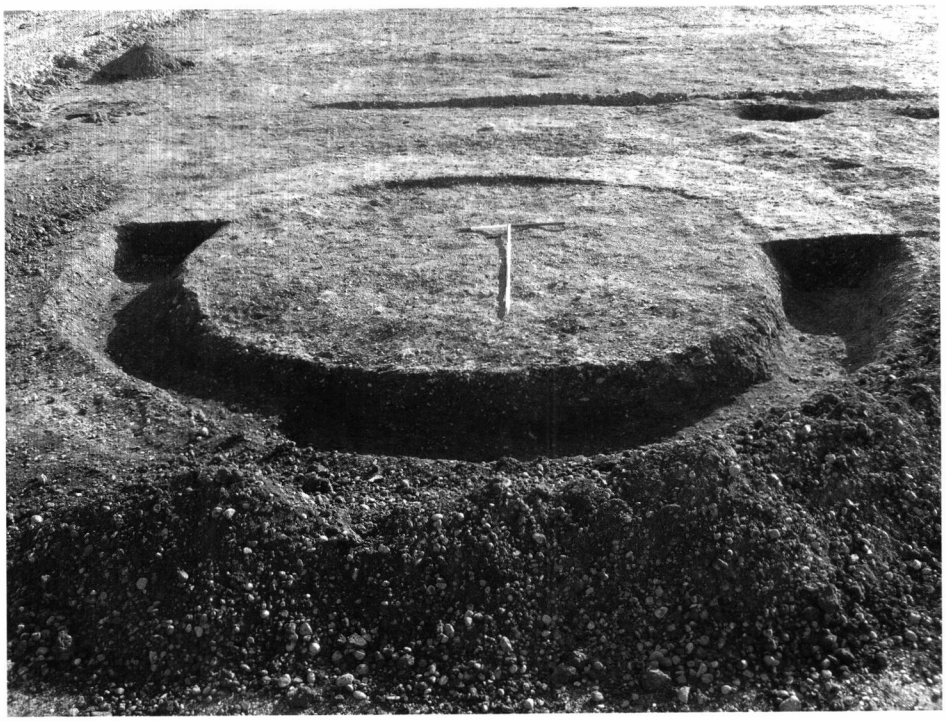


Plate 3: Ring Ditch after excavation showing the trapezoidal ditch profile.

It is a shallow cut with a maximum depth of 200mm filled with a brown deposit (1263) with a clay fraction, though not as markedly clayey as the secondary deposit. This upper fill contained fragmentary remains of pottery or burnt clay of an indeterminate prehistoric date.

Pollen evidence from the middle fill of the ring ditch (1262) contained alder, oak and elm as well as hardy understorey shrubs such as hazel and heather which prefer a damp or even waterlogged environment. Grasses, buttercups, goosefoot and ribwort plantain all describe a largely open landscape with evidence of human intervention. Arable agriculture is shown by the presence of barley, and spores associated with the faeces of domestic animals demonstrate that mixed agriculture was being practised.

Ring Ditch 2 is one of the few features within the excavated area clearly visible on the aerial photographs. Ring Ditch 2 was also sampled by an evaluation trench during earlier evaluation work conducted by Birmingham University Field Archaeology Unit (Hughes and Jones 2001). In this work Ring Ditch 2 was referred to as Ring Gully B, though only one homogenous fill was noted as opposed to the three separate fills excavated during this work. During the earlier evaluation three small pits close to Ring Ditch 2 were excavated, two of which contained fragments of burnt bone and charcoal interpreted as suggestive of redeposited cremation material.

F1057 was a part of Midden Pit Cluster 2 *c.*7.5m north-west of Ring Ditch 2 (Fig. 19). The feature was interpreted as a hearth as it contained a significant amount of fire-reddened and cracked rock indicating *in situ* burning. Whilst the similarity of form and proximity between the midden pits and hearth initially suggested that they were part of a contemporaneous group of features, the two radiocarbon dates from hearth F1057 indicate that it dates from the first

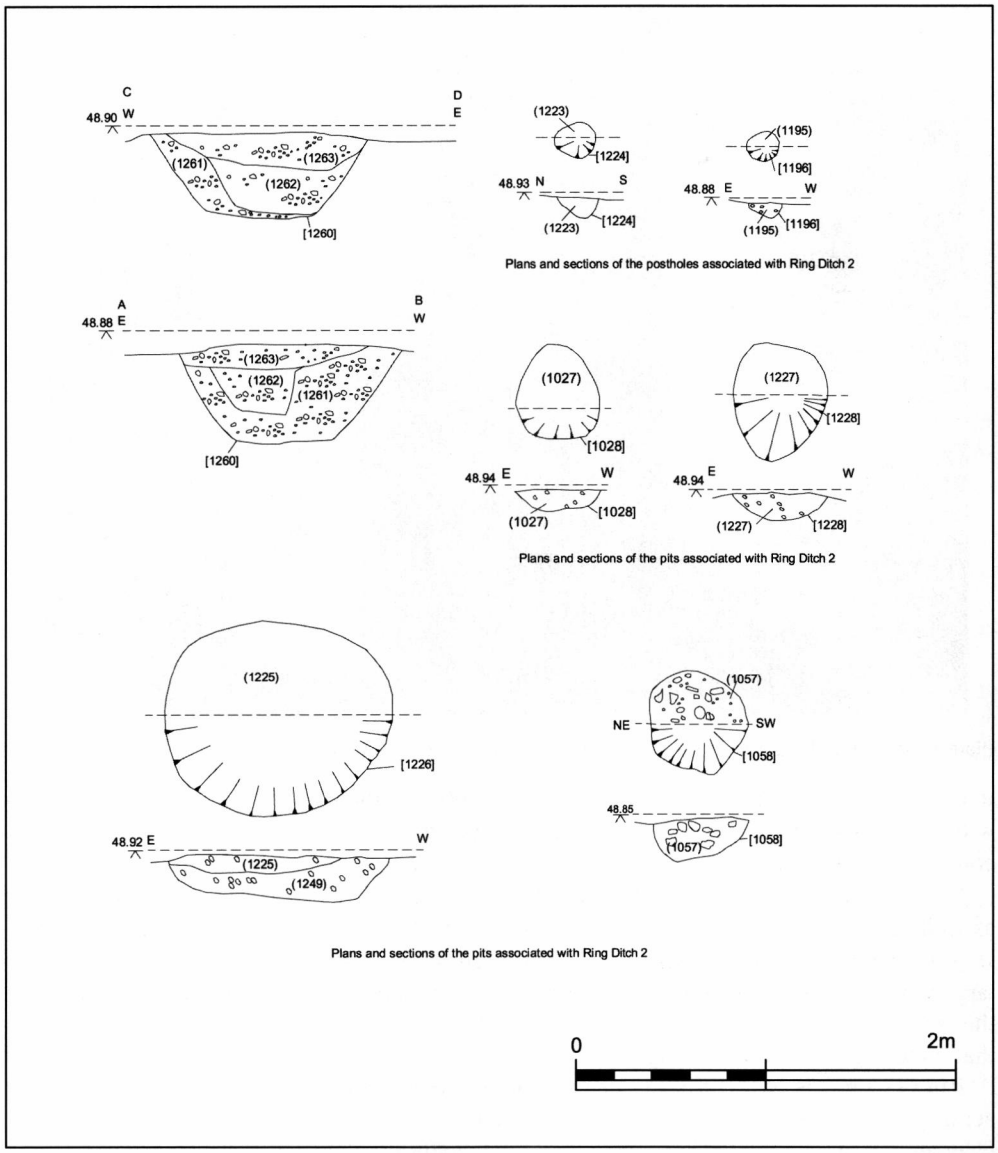


Fig. 19: Sections of Ring Ditch 2 and associated features.

half of the second millennium cal BC; *NZA-30336* provides an estimated date of *1920-1740 cal BC* (*95% probability*), which indicates that it is earlier than the post-built structures but later than the Early Neolithic midden pits by some 2000 years.

Pit Features

The remaining pit features in Area 2 did not form part of a coherent group (Fig. 20). F1087 contained undiagnostic lithic fragments, possibly residual (Lithics Report below). The rest contained no datable material.

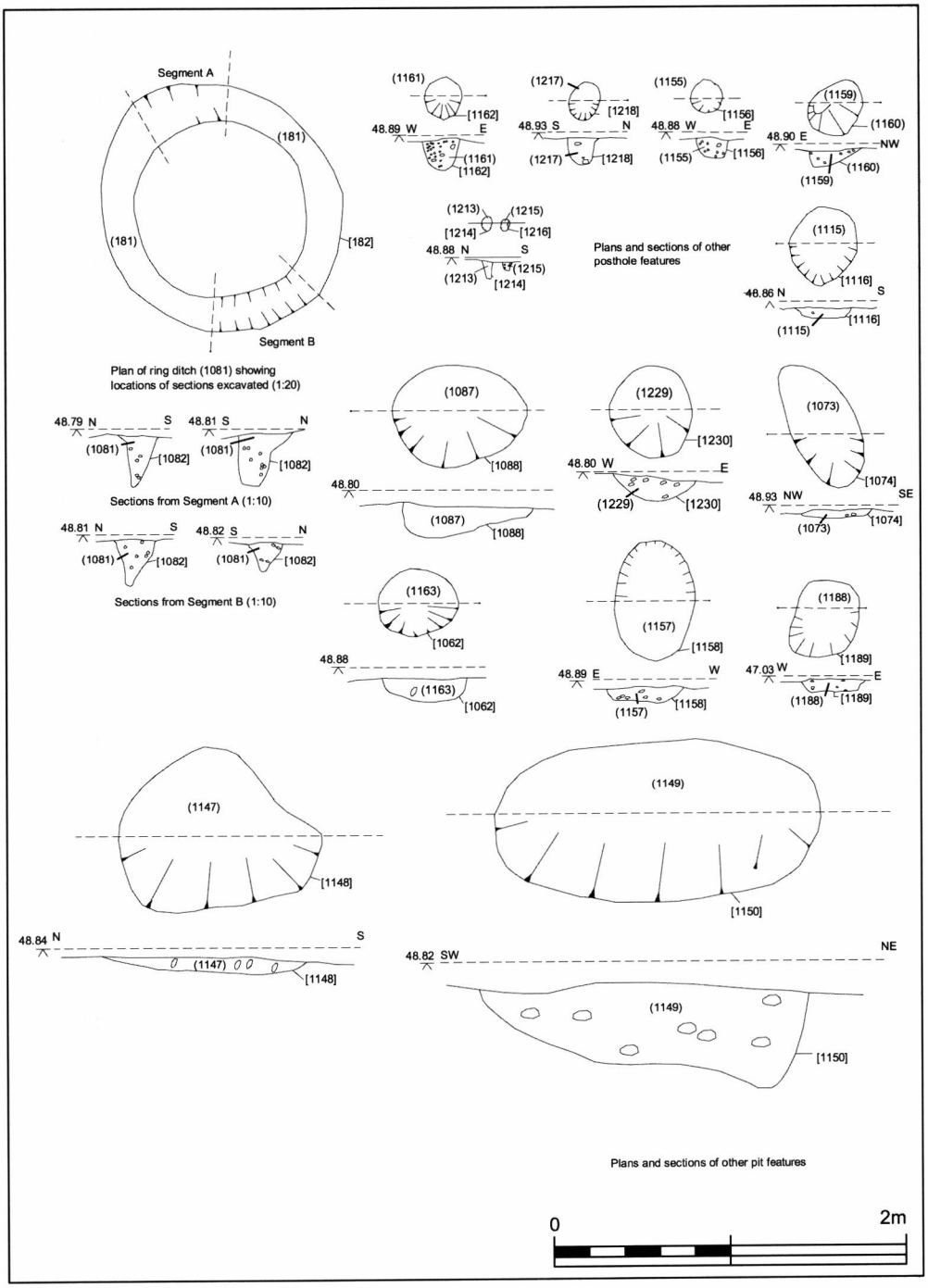


Fig. 20: Plans and sections of remaining pit features in Area 2.

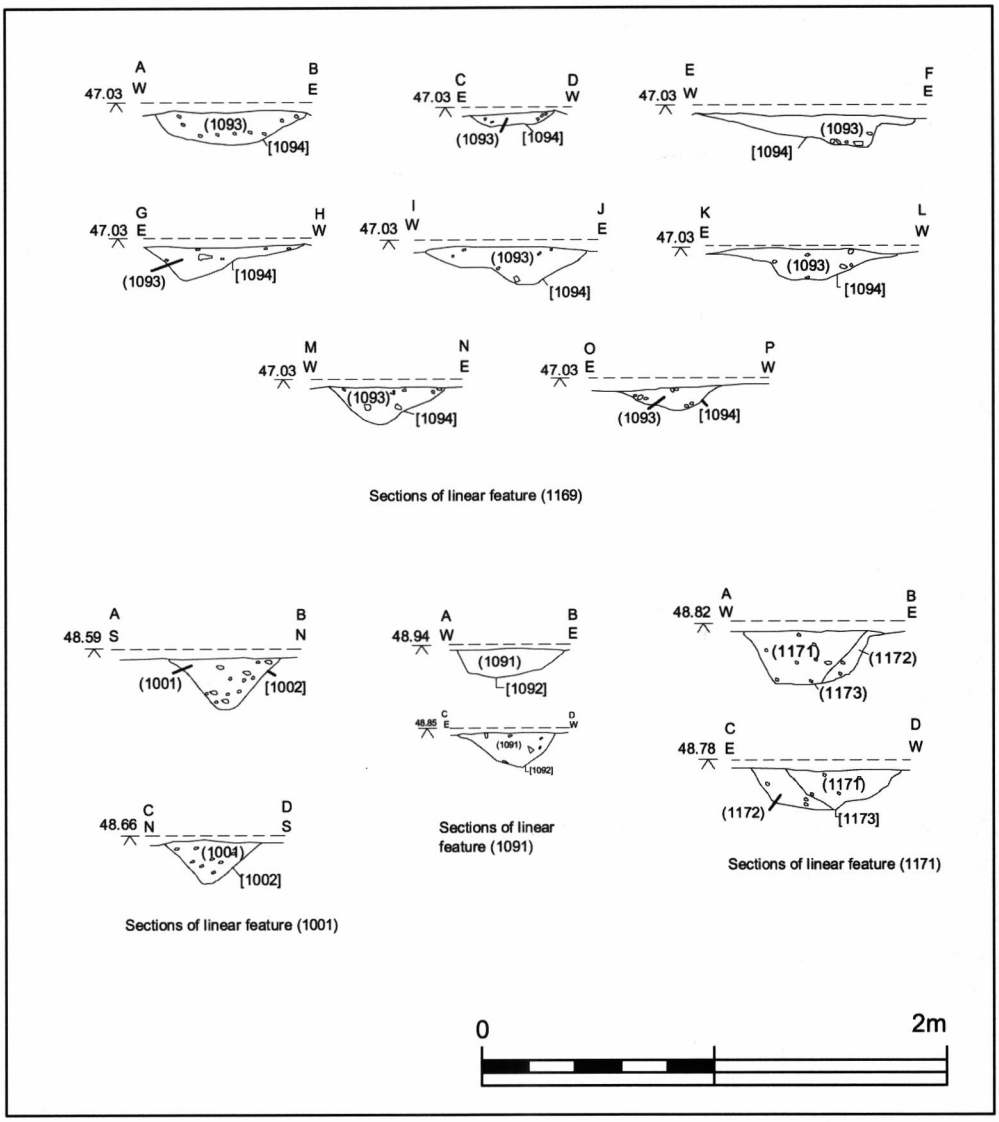


Fig. 21: Sections of linear features in Area 2.

Postholes and Stakeholes

Nine post or stake holes in total could not be ascribed to a larger grouping.

Small ditch feature F1081

F1081 is discussed in its own section as its ring form is anomalous (Fig. 20). It took the form of a small ring ditch too small to actually represent a functional ditch of any kind. There were no finds from the fill and it is possible that it represents a modern cut feature, perhaps

the base of some agricultural machinery or device. The author (JB) has previously observed similar features created by large metal cow-feeders dug into the ground, although this is only a tentative suggestion.

Linear Ditch Feature

The linear ditch features encountered in Area 2 were all similar in form and composition of fill (Fig. 21). Linear feature F1169 cut all other linear features and the tree-throw pit F1063 and represents one of the later phases of activity. There were no diagnostic small finds from a secure context in any of the linear ditch features, with only F1169 yielding a few lithic pieces – all early prehistoric material and residual. F1169 represents one of the long linear ditch features identifiable from aerial photographs, but none of the other linear features coincide with cropmark evidence. These ditches could potentially be of late prehistoric date or later.

SCIENTIFIC DATING

By P.D. Marshall, C. Prior and Clive Waddington

Introduction

Eighteen single entity samples (Ashmore 1999) were submitted to the Rafter Radiocarbon Laboratory, New Zealand in 2008. The 17 charcoal and carbonised plant samples were processed using the acid/alkali/acid protocol of Mook and Waterbolk (1985) and the single sample of cremated bone according to Lanting *et al.* (2001). All the samples were measured by Accelerator Mass Spectrometry (AMS) as described by Zondervan and Sparks (1997).

The laboratory maintains a continual programme of quality assurance procedures, in addition to participation in international inter-comparisons (Scott 2003) which indicate no laboratory offsets and demonstrate the validity of the precision quoted.

Objectives and sampling strategy

The scientific dating programme was designed to achieve the following objectives:

- Define the date of the funerary activity (e.g. cremation(s) and ring ditch).
- Define the sequence of prehistoric activity.
- Provide a precise date for different ceramic traditions represented on the site.

The first stage in sample selection was to identify short-lived material, which was unlikely to be residual in the context from which it was recovered. Where possible material was selected where there was evidence that a sample had been put fresh into its context. The main category of materials which met these taphonomic criteria was charred wood that was functionally related to its context (e.g. the hearth pit) and can reasonably be assumed to represent fuel. Other samples with a less certain taphonomic origin included material from the fill of post-holes; interpreted as relating to the use of structures rather than its construction, as suggested by experimental archaeology (Reynolds 1995). Duplicate samples from these contexts were submitted so as to reduce the likelihood of using dates from residual or intrusive material as having two dates provides a check.

Results

The radiocarbon results are given in Table 1 and are quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). They are conventional radiocarbon ages (Stuiver and Polach 1977).

The calibrations of the results relating the radiocarbon measurements directly to calendar dates are given in Table 1 and in Figure 22. All have been calculated using the calibration curve of Reimer *et al.* (2004) and the computer program OxCal v4.0.5 (Bronk Ramsey 1995; 1998, 2001, 2009). The calibrated date ranges cited in the text are those for 95% confidence. They are quoted in the form recommended by Mook (1986), with the end points rounded outwards to 10 years. The ranges in plain type in Table 1 have been calculated according to the maximum intercept method (Stuiver and Reimer 1986). The ranges quoted in italics are *posterior density estimates* derived from mathematical modelling of archaeological problems (see below). All other ranges are derived from the probability method (Stuiver and Reimer 1993).

Midden Pit (Cluster 1) – F1285

The two measurements (4646±35 BP; NZA-30287 and 4768±35 BP; NZA-30288) on samples from the midden pit (cluster 1) [1285] are statistically consistent (T'=0.2; ν=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The results provide a total possible date range of 3650-3370 cal. BC at 95% confidence.

Hearth Pit (Cluster 2) – F1057

The two measurements (3522±30 BP; NZA-30318 and 3535±25 BP; NZA-30336) on samples from the midden pit (cluster 2) [1057] are statistically consistent (T'=0.1; ν=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The results provide a total possible date range of 1950-1740 cal. BC at 95% confidence.

Structure 1

The two measurements (3400±30 BP; NZA-30280 and 3273±30 BP; NZA-30284) on samples from [1283], a posthole forming part of structure 1, are statistically consistent (T'=0.1; ν=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The results provide a total possible date range of 1760-1450 cal. BC at 95% confidence.

Structure 2

The two measurements (3307±30 BP; NZA-30300 and 1012±30 BP; NZA-30279) on samples from [1231], a posthole forming part of structure 2, are not statistically consistent (T'=2829.8; ν=1; T'(5%)=3.8; Ward and Wilson 1978). The posthole clearly contains material of vastly different ages. The older of the two dates is more reliable as it tallies with the majority of other dates for post-built structures on the site, giving a possible date range for the posthole of 1690-1500 cal. BC at 95% confidence.

Structure 3

The two measurements (3284±30 BP; NZA-30289 and 3316±30 BP; NZA-30302) on samples from [1141], a posthole forming part of structure 3, are statistically consistent (T'=0.6; ν=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The results provide a total possible date range of 1690-1490 cal. BC at 95% confidence.

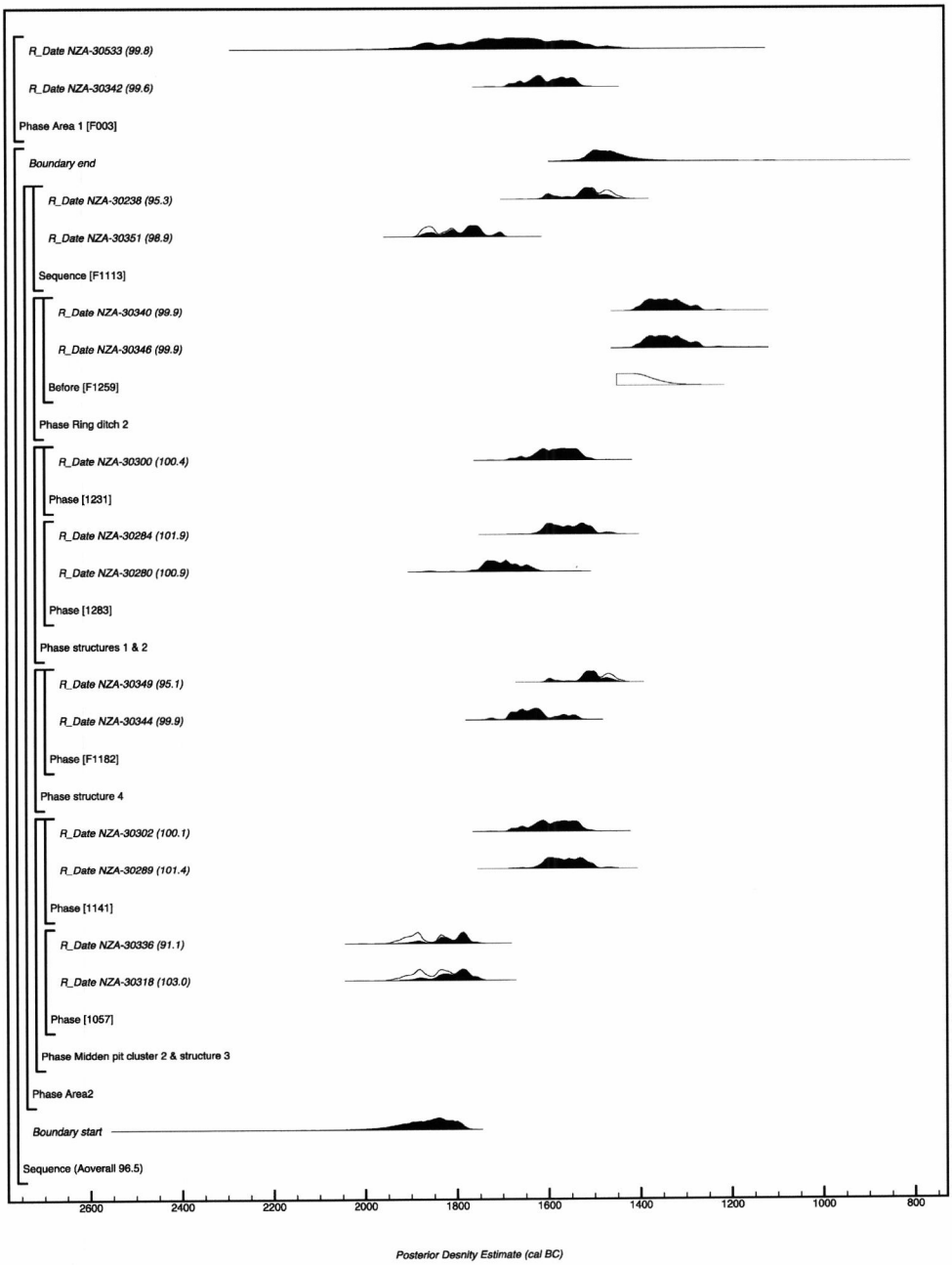


Fig. 22: Probability distribution of radiocarbon dates.

Structure 4
The two measurements (3343±25 BP; NZA-30344 and 3233±25 BP; NZA-30349) on samples from [1182], a posthole forming part of structure 4, are not statistically consistent (T'=9.7; ν=1; T'(5%)=3.8; Ward and Wilson 1978). The calibrated date ranges do overlap however and provide a total possible date range of 1730-1430 cal. BC at 95% confidence.

Bronze Age Pit (F003)
The two measurements (3323±25 BP; NZA-30342 and 3378±95 BP; NZA-30533) on samples from [F003], a pit, are statistically consistent (T'=0.3; ν=1; T'(5%)=3.8; Ward and Wilson 1978) and could therefore be of the same actual age. The results provide a total possible date range of 1930-1440 cal. BC at 95% confidence.

Ring Ditch 2
The two measurements (3059±25 BP; NZA-30346 and 3061±25 BP; NZA-30340) on samples from [1258], the middle fill, are statistically consistent (T'=0.0; ν=1; T'(5%)=3.8; Ward and Wilson 1978). The samples were taken from the middle fill of the Ring Ditch and therefore date the later stages of usage of the monument or possibly provide dates for after the monument has fallen out of use. The results provide a total possible date range of 1420-1260 cal. BC at 95% confidence.

Cremation Pit F1113
The two measurements (3465±25 BP; NZA-30351 and 3235±30 BP; NZA-30238) on samples from [1113] are not statistically consistent (T'=34.5; ν=1; T'(5%)=3.8; Ward and Wilson 1978). A date obtained on a charred cereal grain from the fill of the pit F1113 gave a calibrated date range of 1890-1690 cal. BC at 95% confidence. The date obtained from the cremated remains themselves provided a possible date range of 1610-1430 cal. BC at 95% confidence, which fits the observed stratigraphy that the cremation burial was a later insertion into an earlier pit.

Modelling
A Bayesian approach has been applied to chronological interpretation of the site (see Buck *et al.* 1996). Although the simple calibrated dates are accurate estimates of the dates of the samples this is usually not what archaeologists really wish to know. It is the dates of the archaeological events which are represented by those samples which are of interest. In the case of Mercia Marina, it is the chronology of the use of the structures and funerary activity that is under consideration, not the calibrated dates of the individual samples. The dates of this activity can be estimated not only using the absolute dating information from the radiocarbon measurements on the samples, but also by using the stratigraphic relationships between samples.

Fortunately, methodology is now available which allows the combination of these different types of information explicitly, to produce realistic estimates of the dates of archaeological interest. It should be emphasised that the *posterior density estimates* produced by this odeling are not absolute. They are interpretative *estimates*, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives.

Laboratory Code	Context	Material	Radiocarbon Age BP	$\delta^{13}C$ (‰)	Calibrated Date Range (95% confidence)	*Posterior Density Estimate (95% probability)*
NZA-30280	F1283, posthole forming part of structure 1	Charcoal, *Corylus* sp.	3400±30	-25.3	1760-1620 cal BC	*1770-1620 cal BC*
NZA-30284	F1283, posthole forming part of structure 1	Charcoal, *Corylus* sp.	3273±30	-27.4	1630-1450 cal BC	*1630-1490 cal BC*
NZA-30300	F1231, posthole forming part of structure 2	Charcoal, *Corylus/Alnus* sp	3307±30	-26.6	1690-1500 cal BC	*1680-1510 cal BC*
NZA-30279	F1231, posthole forming part of structure 2	Charcoal, Maloideae sp	1012±30	-28.2	cal AD 980-1120	-
NZA-30287	F1285, midden pit cluster 1	Charcoal, *Corylus* sp.	4746±35	-23.8	3640-3370 cal BC	-
NZA-30288	F1285, midden pit cluster 1	Charcoal, Maloideae sp	4768±35	-25.6	3650-3380 cal BC	-
NZA-30289	F1141, posthole forming part of structure 3	Charcoal, *Corylus* sp. roundwood	3284±30	-25.1	1640-1490 cal BC	*1640-1490 cal BC*
NZA-30302	F1141, posthole forming part of structure 3	Carbonised naked barley grain	3316±30	-25.3	1690-1510 cal BC	*1690-1520 cal BC*
NZA-30318	F1057, midden pit cluster 2	Charcoal, *Alnus* sp.	3522±30	-26.3	1940-1740 cal BC	*1900-1740 cal BC*
NZA-30336	F1057, midden pit cluster 2	Charcoal, Prunus sp.	3535±25	-23.6	1950-1770 cal BC	*1920-1750 cal BC*
NZA-30344	F1182, posthole forming part of structure 4	Charcoal, *Alnus* sp.	3343±25	-26.6	1730-1530 cal BC	*1700-1530 cal BC*
NZA-30349	F1182, posthole forming part of structure 4	Charcoal, *Alnus* sp.	3233±25	-26.7	1610-1430 cal BC	*1610-1440 cal BC*
NZA-30346	F1259, middle fill of Ring Ditch 2	Charcoal, *Corylus* sp.	3059±25	-25.5	1410-1260 cal BC	*1410-1260 cal BC*
NZA-30340	F1259, middle fill of Ring Ditch 2	Charcoal, *Corylus/Alnus* sp	3061±25	-27.8	1420-1260 cal BC	*1410-1260 cal BC*
NZA-30351	F1113, primary fill of cremation pit	Carbonised wheat grain	3465±25	-25.7	1890-1690 cal BC	*1880-1690 cal BC*
NZA-30238	F1113, cremated remains	Cremated bone	3235±30	-23.8	1610-1430 cal BC	*1610-1450 cal BC*
NZA-30342	F003, pit	Carbonised cereal grain	3323±25	-22.1	1690-1520 cal BC	*1680-1520 cal BC*
NZA-30533	F003, pit	Carbonised cereal grain	3378±95	-23.2	1930-1440 cal BC	*1910-1450 cal BC*

Table 1: Radiocarbon dates.

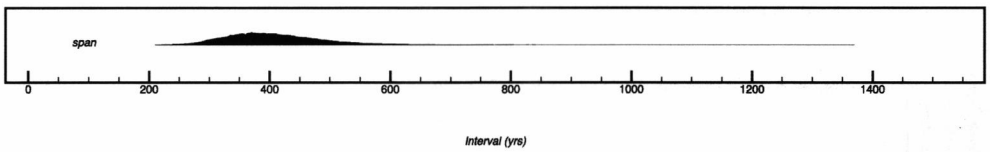


Fig. 23: Probability distribution of length of period of Bronze Age occupation.

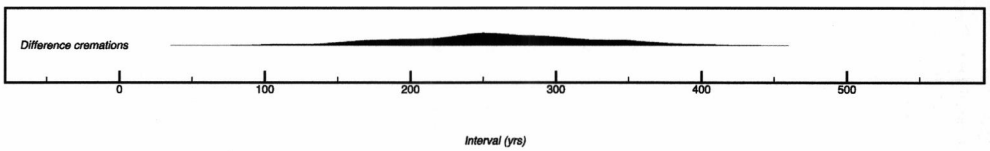


Fig. 24: Probability distribution of length of use of cremation pit F1113.

The technique used is a form of Markov Chain Monte Carlo sampling, and has been applied using the program OxCal v4.0.5 (http://c14.arch.ox.ac.uk/). Details of the algorithms employed by this program are available from the on-line manual or in Bronk Ramsey (1995; 1998; 2001; 2009). The algorithm used in the model described below can be derived from the structure shown in Figure 22.

The date range obtained from the midden pit in Midden Pit Cluster 1 show Neolithic settlement activity to have taken place on the site during the period 3650-3370 cal. BC. It is noteworthy that this date range associated with Carinated Bowl pottery is at the later end for the use of this ceramic style when compared for example with those dates for Carinated Bowl pottery that have been summarized for Northumberland (Passmore and Waddington 2009; 2012) and Scotland (Sheridan 2007).

The model shown in Figure 23 shows good overall agreement (A=96.5%) and provides an estimate for the start of Bronze Age activity in Area 2 of *2000-1770 cal BC* (*95% probability; start*; Fig. 23) and probably *1910-1790 cal BC* (*68% probability*). Activity is estimated to have ended in *1570-1340 cal BC* (*95% probability; end*; Fig. 22) and probably *1520-1430 cal BC* (*68% probability*) and to have lasted for between *250-600 years* (*95% probability; span*; Fig. 24) and probably *310-470 years* (*68% probability*).

The results illustrate that the post-built structures and funerary activity were part of a contemporary phase of activity on the site. This suggests that either the post-built structures are a part of the funerary activity, or that they are domestic structures and there was no clear delineation between domestic and funerary on the site. The results from cremation pit (F1113) estimate that the gap between the initial deposition of a cremation in a ceramic vessel and the secondary insertion of pot 78 containing a cremation was *130-390 years* (*95% probability; difference cremations*; Fig 24.) and probably *180-320 years* (*68% probability*).

LITHICS REPORT

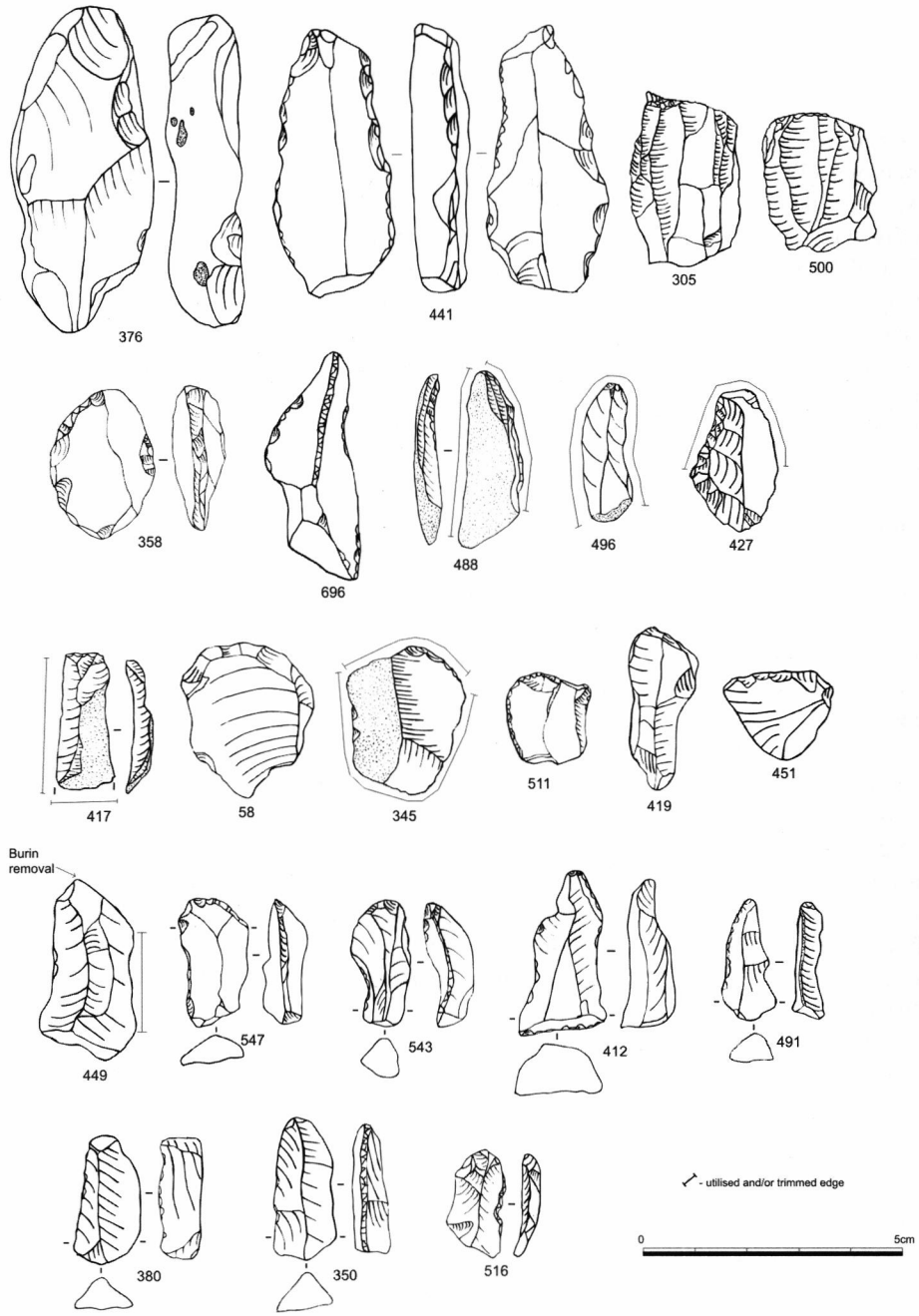
By Clive Waddington

Introduction

A total of 189 lithics was submitted for analysis. The lithics come from a range of contexts in Areas 1 and 2, although most were retrieved from pit features associated with Neolithic activity, and some from unstratified topsoil. Those from unstratified topsoil were bagged by area whilst those from archaeological features were bagged according to their context. A catalogue with details of each individual lithic is in the archive and measurements are given for complete pieces only in accordance with lithic recording conventions (Saville 1980). Cores have only their two longest measurements recorded. Although the assemblage of lithic material is of a moderate size, a large proportion of these pieces (33.3%) are formal tools that include many chronologically diagnostic pieces, and this allows some inferences to be drawn from the assemblage.

Chronology

Although much of the assemblage comprises Mesolithic and Neolithic material there is also what appears to be a small Late Upper Palaeolithic (LUP) component. The latter material includes occasional blade-based tools (e.g. Fig. 25.376) together with chipped material that has been recycled into other tool forms during the Mesolithic and Neolithic. The LUP component is usually heavily patinated, often a milky white colour, and has heavily rounded edges and 'arrêt-rounding' giving an almost 'melted' look (Collcut 2006, 48). These pieces survive as residual material in the fills of later features or as material collected in the past with the intention of recycling it. The dates for LUP activity in the region come primarily from Creswell Crags but also from two cave sites in Earl Sterndale (all Derbyshire) and date from around *c.*13000 cal BC through to *c.*11000 cal BC (Jacobi 2006, 44-5). The Mesolithic material is also of interest as it may include both Early and Late Mesolithic material, at least if patina development is anything to go by. The raw material used for the Mesolithic pieces appears to have come from a wide variety of sources although most of it from secondary geological sources. Some of the material is very heavily patinated, such as the short stubby edge-trimmed microlithic pieces (e.g. Fig. 25.350, 380, 491, 496) with their distinctive v-shaped profile (Fig. 25). These are considered the most likely contenders for Early Mesolithic material. The later Mesolithic component includes more typical 'narrow blade' forms which usually have a complete absence of patina development. Although recortication is a chemical process that can be influenced by a range of factors including soil chemistry and so forth, there is clearly also a link between time and the acquisition of a patina. Much of the Trent valley lithic material belonging to the LUP and Mesolithic has well-developed patination and one reason for this is that, not only is there a considerable time-depth apparent in the lithic assemblages of the valley, but also some of the raw material has a coarse texture which may facilitate the rehydration of the chipped stone – as patina development occurs due to the gradual absorption of water into the outer layer of flint. The Early Mesolithic material could potentially date from as early as 10,500 cal BC whilst the later Mesolithic material is unlikely to date from before 7800 cal BC, given that the earliest dates for the later 'narrow blade' material now appear to come from North-East Britain and could be associated with the spread of this kind of technology as a consequence of population displacement from the North Sea plain as a result of sea level rise (Waddington 2007; Passmore and Waddington 2012).



Two possible Late Upper Palaeolithic Blades 376, 441; Mesolithic Platform Cores 305, 500; Edge Trimmed Blades 358, 696, 488; Mesolithic Edge Trimmed Blade/Microlith 496; Retouched Blade 427; Mesolithic End Scraper 417; MesolithicScrapers 58, 345, 511, 419, 451; Burin 449; Microliths 547, 543, 412, 491, 380, 350, 516.

Fig. 25: Lithic artefacts (1)

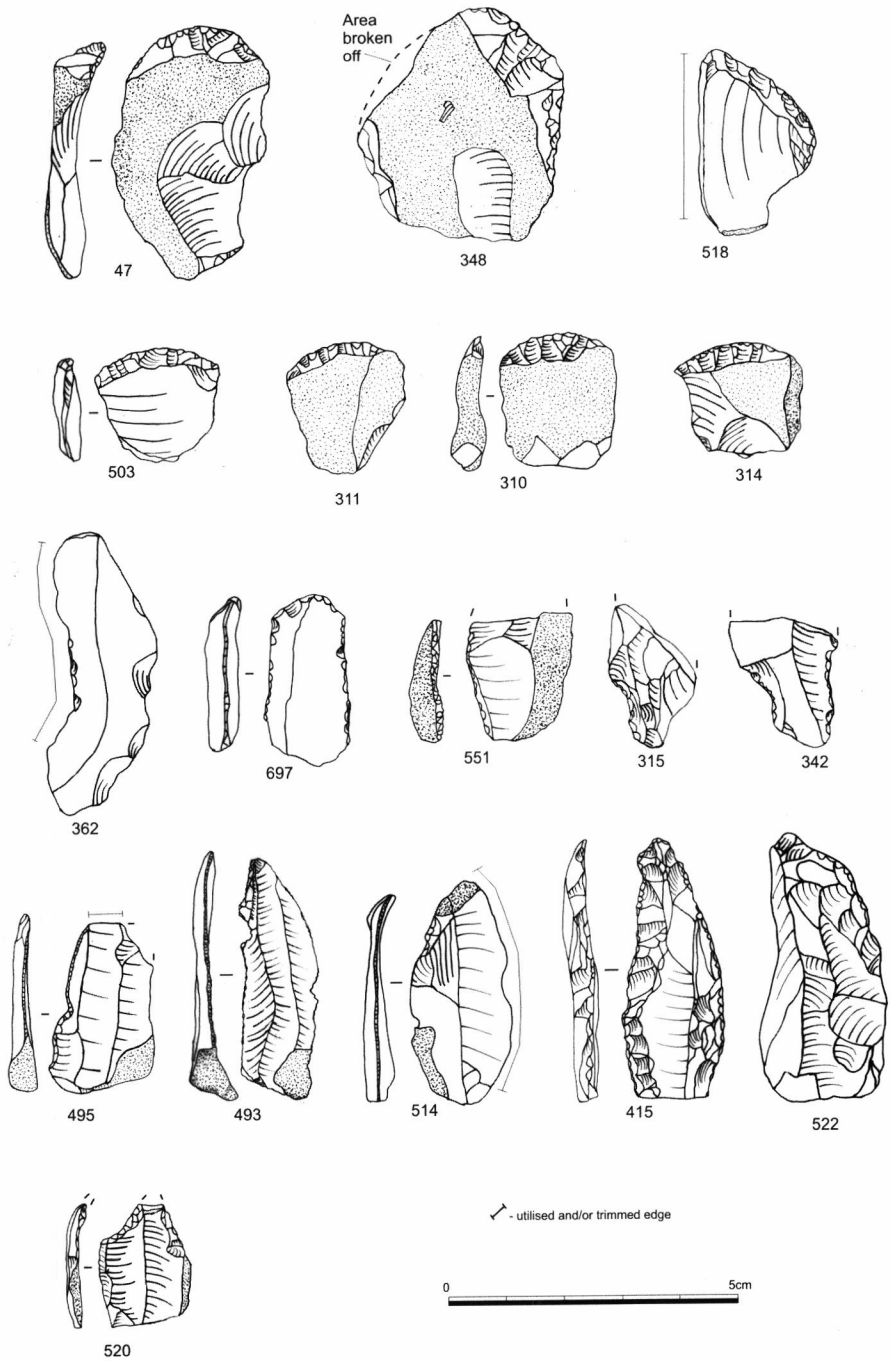


Fig. 26: Lithic artefacts (2)

The Neolithic component of the assemblage corresponds with the midden pit remains on the site. Neolithic material includes readily recognisable pieces, such as end scrapers (e.g. Fig. 26.47, 310, 527), notched blades (e.g. Fig. 26.493 and 514) and other types of blade forms as well as other tools and modified blades that do not conform to any of the typical lithic typefossils usually ascribed to this period. Neolithic pieces recovered from Mercia Marina sit most comfortably in an Early Neolithic context and are therefore thought most likely to date from *c.* 4000 – 3000 cal BC which aligns with the radiocarbon dates so far available for the site. The Neolithic material includes flint obtained from both local and distant sources, although there is possibly a preference for imported nodular flint, as can be seen with the high quality dark grey flint tools that still have small areas of chalky cortex surviving on their surface (e.g. Fig. 26 end scraper 47). This observation correlates with that from other sites where Mesolithic groups were more self-reliant and engaged in using raw materials close to hand, as well as recycling pieces in a more frugal way, whilst during the Neolithic a preference can be seen for utilising high quality imported flint that is rarely recycled. This is a feature recognised in other Mesolithic assemblages across northern England (Waddington 2004) suggesting that wide ranging exchange networks were an important feature of Neolithic communities from the outset of Neolithisation.

Distribution

The lithic distribution reveals a degree of patterning. Of the various Mesolithic, or probable Mesolithic, flints five were retrieved from the fills of the tree-throw pit F1063. Most of the other material is likely to be residual as three were recovered from one of the Neolithic midden pits (F1211) and four from one of the stakeholes (F1123) associated with Structure 3, all of which are patinated. Three more came from the large linear ditch feature F1169 in Area 2, which is thought to be late prehistoric in date. All other diagnostic Mesolithic pieces occurred as the only identifiably Mesolithic flint in later contexts which comprise predominantly pits and postholes likely to relate to Neolithic and Bronze Age activity. Apart from two residual Mesolithic pieces recovered from the Bronze Age pit in Area 1 (F003) the rest of the diagnostic Mesolithic material was recovered from Area 2.

Three of the six definite Neolithic pieces (1079, 1219, 1281) come from Neolithic midden pits in Area 2, one was from another pit in Area 2 and two were from the secondary fill of the tree-throw pit (F1063). Two of the Neolithic flints from the midden pits were scrapers and the other a retouched blade – all suggesting processing activities. Of the five probable Neolithic pieces, three came from the fill of linear ditch feature F31 in Area 1, but these are probably residual as this linear feature is thought to be of late prehistoric date. Another probable Neolithic piece was recovered from the fill of linear ditch F1091 in Area 2 and another one from the tree-throw pit fills from F1063.

Raw Material

The lithic material is composed predominantly of flint (98.9%), although there are two chert pieces (1.1%). Only a few lithics were broadly provenanced to a glacial or nodular source, as this depends primarily on the survival of cortex on part of the chipped piece. A total of 18 was ascribed to a river gravel source on account of their thin, abraded and smoothed cortex, and six were ascribed to a nodular source, on account of the white chalky cortex, and represent imports to the area. The flint pieces of Neolithic date are generally made out of high quality flint and account for most of the nodular derived pieces. The nearest sources of

nodular flint are the Yorkshire and Lincolnshire Wolds and East Anglia, and some of the flint used is of such high quality (e.g. Fig. 26. 47, 493) that it may be the prized 'floorstone' flint obtained from Neolithic flint mines in Norfolk (Barber *et al.* 1999). Nodular flint's presence in the Neolithic assemblage indicates the existence of an exchange system at this time which allowed groups inhabiting the Trent Valley to obtain materials from distant sources; and with the exchange of materials there must also have been an exchange of ideas. Neolithic groups in the Trent Valley evidently had access to widespread communication networks, and this is reflected also in their use of pottery traditions typical of other Neolithic groups across Britain at this time (Ceramic report below).

In contrast, pieces that are Mesolithic, or probably Mesolithic, occur on flint of more local origin, probably from river valley till and/or fluvio-glacial deposits. A range of colours is present but colour is not always a useful indicator of a flint's provenance, and in the case of the Mercia Marina assemblage many of the flints are heavily patinated (29.1%) and so their actual internal colour could not be ascertained. The main flint colours present include 23.8% light grey, 21.2% medium grey, 7.4% white, 5.3% dark grey, 4.2% orange-grey and 4.2% cream. Noticeabley some Mesolithic material is completely unpatinated (e.g. lithics from tree throw pit F1063) whilst other Mesolithic material in the assemblage is fairly heavily patinated. This difference is thought to reflect the different ages of these pieces rather than to be the result of localised differences in soil chemistry or the effects of wetting and drying. It is perhaps significant that all the stubby edge-trimmed bladelets, which form an unusual class of steep v-shaped profile microlithic pieces, are all patinated whilst those conforming to more recognizable forms are unpatinated. On several pieces which had acquired a thick white patina it was noted that the internal flint colour was usually a light grey.

Flaking and Manufacture

The assemblage displays evidence for use of both hard and soft hammer flint working, with most of the retouch unifacial. There is also much use of slight modification to blades and flakes, usually in the form of edge-trimming or only minimal retouch. No doubt this was a response to the limitations of the raw materials being exploited as the presence of cortex on many pieces indicates that many nodules must have been small in the first instance. Both the Mesolithic and Neolithic manufacturing traditions relied on a blade-based technology, although Neolithic pieces tend to be larger. This assemblage is characterised by short, and often stubby, narrow parallel-sided blade forms modified into a variety of tools. A concern with producing parallel-sided blades is a characteristic common during both the later Mesolithic and Early Neolithic (Pitts and Jacobi 1979) and this assemblage is in keeping with this wider trend. However, their often stubby or occasionally irregular appearance reflects the limitations of the raw material. Bi-polar working is reasonably common in the assemblage, again indicating the availability of only small sized nodules. A number of pieces display the central ridge which results from detachments occurring at both the proximal and distal ends, the latter due to the countershock (e.g. 46, 308, 530 – not illustrated). A few hinge fractures are evident in the assemblage suggesting some flawed nodules and/or novice flaking. There is clear evidence for recycling of previously chipped pieces primarily in the Mesolithic assemblage. This not only provides proxy evidence for the presence of earlier Mesolithic and perhaps Palaeolithic activity but that careful husbanding and curation of flint took place during the Mesolithic. A good example is the recycled flint flake (2 – not illustrated) which has been used as a core before finally being re-used as a scraper. Different phases of patination can be observed on this piece.

Types

A wide range of tool types is present in the excavated lithic assemblage and these are summarised in Table 2.

Lithics ascribable to a point in the core reduction sequence revealed a relatively limited proportion relating to the primary stage of the sequence (7.9%), whilst a high proportion related to the tertiary stage on account of having been retouched or utilised (33.3%),and the rest belonged to the secondary stage (50.8%) or were indeterminate (7.9%). A high number of finished tools and utilised pieces (33.3%) indicates that tool use and maintenance was a dominant activity at this site and that primary flaking was largely carried out elsewhere, no doubt closer to raw material source/s.

Processing tools, such as various edge-trimmed, retouched and utilised blades, scrapers, microliths, a burin, and a possible awl and knife suggest a wide range of activities, which are usually taken to indicate settlement sites (Schofield 1991; 1994) (Table 3). The presence of scrapers suggests that hide working was an important activity while the presence of notched blades is also notable, particularly as both came from the same pit (493, 514 - not illustrated). Overall, the volume of diagnostic tool types is low, but this does not detract from the high proportion of modified and utilised pieces in the assemblage. Although many of the modified blades do not fit comfortably into traditional typological categories, they do reflect processing activities at and around the site.

Type	*Number*
Core	10
Chip	11
Flakes	69
Blades	36
Edge-Trimmed Blades	12
Edge-Trimmed Flakes	10
Utilised Blade	5
Retouched Blades	4
Retouched Flakes	4
Scrapers	16
Notched Blades	2
Microliths	7
Burin	1
Awl?	1
Knife?	1
Total	**189**

Table 2: Summary of lithic types.

Discussion

Evidently this site has been visited over a long period of time by people including possibly Late Upper Palaeolithic, but certainly Mesolithic and Neolithic groups. The continued interest in this locale, on river terraces elevated above the floodplain proper of the middle

Trent Valley, reflects the attractions of this location being close to freshwater, on flat and free-draining ground and close to a rich riparian habitat. An abundance of foodstuffs in this general location must have been an important draw as animals will have been attracted to the river's edge, whilst fish, fowl and birdlife will have been easily taken. Furthermore, plant foods and vegetation would have provided important sources of food, building materials and possibly even clothing. Clearly this area of the middle Trent formed a very important focus for Mesolithic hunter-gatherers but also for early farming groups of the Neolithic who built settlements and constructed a wide range of ceremonial and burial monuments on the raised gravel terraces above the Trent flood plain.

During the Mesolithic acquisition and recycling of locally available flint took place which suggests Mesolithic groups were largely self-sufficient and obtained most of their raw materials from relatively nearby, secondary geological sources. Activity may have taken place throughout much of the Mesolithic period - a period spanning around 7000 years. However patination development on struck flints still remains poorly understood and so the view that the presence/absence of patination on the various Mesolithic pieces reflects differences in age can only remain provisional. The Mesolithic material tends to have been made on stubby blades and most are of irregular form with few comparative examples known.

The Neolithic assemblage from Mercia Marina contains a high proportion of tools and this equates directly with other Neolithic settlement locales, such as that recently excavated at Dale View Quarry in the Peak District (Brightman and Waddington 2010) and sites further afield such as that near Bolam Lake in Northumberland (Waddington and Davies 2002). Lithic material recovered during earlier excavations at the Willington Quarry site (Wheeler 1979) shares much in common with that from the Mercia Marina site. Both assemblages have numerous trimmed flakes and blades together with end scrapers and other modified blade tools such as knives. Some Neolithic pieces in the Mercia Marina assemblage are made on imported nodular flint that must have travelled to the Trent Valley by way of long distance exchange networks. The relatively low density of material and absence of primary waste, together with the high tool counts suggests that this locale formed a settlement site (Table 3) for Neolithic groups, as evidenced also by the midden pits. A range of Neolithic tool types implies that a wide range of activities took place on the site and no doubt included food preparation, treatment of animal skins and the building and maintenance of shelters as well as production of clothing and so forth.

Activity	*Density*	*Primary Waste*	*Tools*	*Cores*
Settlement	Low	Low	High	High
Industrial	High	High	Low	Low

Table 3: Schofield's 'Expected assemblage characteristics for domestic and industrial areas assuming a policy of extra-home range production' (i.e. where flint is imported from a source area some distance from the main settlement area) (1991, 119).

Although the Neolithic flint assemblage is not huge this quantity of material from truncated midden pits is in keeping with numbers recovered from other midden pit sites.

Overall most of the Mesolithic forms are irregular and reflect opportunistic use of locally available flint that occurs in small nodules, often with impurities and sometimes poor flaking properties. Much of the material is residual, particularly the Late Upper Palaeolithic and Mesolithic material, as much of this was retrieved from Neolithic features. Another key feature of the assemblage is the frequency of heavy patina development on much of the pre-Neolithic material reflecting human use of this landscape extending back, probably, to the last Ice Age. A frequent observation is the re-use of this early chipped material in later periods, particularly in the later Mesolithic. Heavily patinated chipped flints can be found in the natural sand and gravel substratum across the site and these represent palaeoliths deposited as part of the sediment body at the end of the last Ice Age. These pieces will have travelled from further upstream and provide a proxy record of human activity in the catchment of the meltwaters feeding the Trent Valley. Some recycled material found in the Neolithic features at Willington comprises this material and implies that flint was being collected from the gravel. Obvious places to obtain such material would have included exposures in stream sections and river cliffs as well as those caused by tree throws.

CERAMICS REPORT

By Clive Waddington

Introduction

A substantial assemblage of prehistoric pottery was recovered from Areas 1 and 2. In Area 1 one pit F003 produced late Bronze Age pot fragments belonging to the Deverel-Rimbury tradition and elsewhere some indeterminate first millennium cal BC pottery from F173. Area 2 produced the largest quantity of ceramic material consisting of Early Neolithic Carinated Bowl pottery, a single pit F1193 with Impressed Ware pottery, together with Early Bronze Age pottery associated with the human cremations in Ring Ditches 1 and 2. The Early Neolithic material came from a series of midden pits forming two main clusters (1 and 2). These pottery styles provide a sequence through from the beginning of the fourth millennium cal BC to the mid 3rd millennium cal BC. Carinated Bowl pottery appears to have been used for domestic purposes whilst the Early Bronze Age pottery is associated with funerary activities. The Neolithic assemblage compares closely with that found on the adjacent and contiguous site known as Hill Farm, Willington (Woodward and Hancocks in Hughes and Jones 2001), and with the assemblage retrieved from the excavations at the Willington Quarry site 2km to the west (Manby in Wheeler 1979).

A total of 409 Neolithic and Early Bronze Age sherds representing at least 61 vessels and 94 later prehistoric sherds representing six vessels was recovered, together with 18 sherds representing nine indeterminate vessels as well as large numbers of crumbs. Several sherds were found to conjoin and for the purposes of overall totals these are counted as a single sherd. In total a minimum of 76 vessels were identified for the whole assemblage. Sherds are generally small and in most cases the complete profile of a pot was not reconstructable. A wide range of ceramic styles are present and these are considered individually below.

Method Statement

Pottery recovered during excavation was taken directly from the excavated deposits and placed in acid-free paper before being individually wrapped in bubble wrap and then bagged and labelled in polythene bags. On return to the laboratory the pottery was lightly cleaned under running water and then left to air dry before being lightly brushed with a soft sable shaving brush to remove excess soil. The sherds were laid out by context and then individually analysed and grouped into distinct pots on the basis of fabric, size and form. A x3 magnification hand-held magnifying glass was used to assist with the visual inspection. No further cleaning or washing was undertaken so as to allow for the future possibility of residue analysis. Sherds that could be conjoined were glued together using a waterproof solvent-based adhesive.

Early Neolithic Ceramics

The Early Neolithic ceramics display attributes associated with traditional Carinated Bowls and related pottery, which includes plain bowls and cups, and is dated to *c.*3900-3600 cal BC in the British Isles. This group forms the largest component of the total ceramic assemblage and is characterised by a well-fired, highly burnished fabric, everted rims, upright rims, carinations, occasional upright shoulders, an absence of decoration and in many cases an open and shallow profile (Gibson and Woods 1997, 175-8; Gibson 2002a) (Figs 27, 28 and 29). It includes what Sheridan has termed 'traditional Carinated Bowl' as well as 'modified Carinated Bowls', the latter identified in this case by the presence of a perforated lug on vessel 35. Some vessels have carinations high up in their profile (what Herne 1988 has termed 'Shouldered Bowls') whilst others have them lower down. There are also plain vessels with no shoulder or carination but rather an upright body with plain rounded rim. None of the material is decorated except for one sherd from pot 40 with a fingernail impression.

The Mercia Marina material most closely resembles the early Carinated Bowl tradition which in the early 4th millennium cal BC shows remarkable uniformity across very large areas of Britain . It compares closely with assemblages from elsewhere in the Trent Valley as well as Yorkshire and the North East such as Nosterfield (Vyner 1998), Marton-le-Moor (Manby 1996; Taverner 1996), Cheviot Quarry (Johnson and Waddington 2008), Thirlings (Miket 1976; 1987; Miket *et al.* 2008) and Bolam Lake (Waddington and Davies 2002) and other East Midlands sites such as Lismore Fields in the Peak District (Garton 1991) and the nearby Willington Quarry site (Manby 1979). The assemblage does not show any affinities with any of the southern modified Carinated Bowl traditions such as the Whitehawk, Mildenhall, Abingdon, Windmill Hill and Hembury sub-styles. Although there is some evidence for East Anglian and southern connections within the region, as indicated by the presence of nodular flint (see above) and Mildenhall/Abingdon style pottery from Wigber Low, a site situated in a northern tributary valley of the Trent and commanding a view to the Trent Valley itself (Collis 1983; Manby 1983). However, it is most common for other Trent Valley and Peak District sites to produce ceramics comparable with northern Carinated Bowl traditions, such as those recovered from the adjacent Hill Farm site (Woodward and Hancocks 2001), Willington Quarry (Manby 1979), Swarkestone (Greenfield 1960, 33), Attenborough (Alvey 1966) and Aston-on-Trent (Reaney 1968) and in the Peak District from Green Low chambered tomb (Manby 1965) and Lismore Fields (Garton 1991).

Fabric

Early Neolithic fabrics are conspicuous by their dense and laminated structure, and the common use of crushed quartz inclusions, river-rounded fine pebbles and occasional crushed sandstone and limestone, as well as what appears to be an early use of grog. These inclusions have clearly been specially prepared for the purpose and can be fairly coarse being frequently 4mm across and sometimes up to 8mm across. Generally fabrics are evenly fired throughout making the pots strong and durable. Both thick and thin-walled vessels are evident with most of the material ranging between 4mm and 10mm in thickness. The coarse nature of the crushed stone inclusions means that quartz inclusions frequently erupt on both the internal and external surfaces of these pots giving them a speckled appearance. Consistent colouring on most pots indicates an even firing process which is likely to have taken place in a reducing atmosphere given the dark colour of many sherds. The pots are well-made and usually have a highly burnished finish on both inner and outer surfaces, suggesting use of a burnisher (e.g. smoothing stone or leather cloth), although some grass wiping is evident. A number of sherds have fractured along coil lines revealing the method by which the pot was constructed.

Form

The vessels are mostly of carinated bipartite form, but sometimes have a classic S-shaped or bag-shaped profile or form a plain upright bowl. A few bowls have an upright form with plain upright rims whilst others have an open shallow profile. Profiles of all the bowls curve at their bases which are round-bottomed. In size they range from large storage and cooking vessels, some of the latter still retaining burnt organic residues on their inner surfaces, to smaller bowls, open bowls and cups. The latter group of pots is likely to have been used for eating, drinking and serving food. The range of forms present suggests a full suite of domestic vessels associated with the storage, cooking and consumption of food. Decoration is absent from Early Neolithic vessels in this assemblage although there are examples of decoration on 10% of the early Neolithic vessels from the adjoining Hill Farm site (Woodward and Hancock 2001), in the form of rows of vertical or diagonal incised lines located on the top or just inside the rim and shallow U-shaped impressions on the shoulder of a Carinated Bowl. A good example of a perforated lugged vessel (pot 35) from Pit F1127, associated with structure 3, compares with two early Neolithic vessels with perforated lugs found on the adjoining Hill Farm site (*ibid.*). A few rims provide information on internal rim diameters which range from 180mm to 210mm across, although some vessels are clearly much smaller than this. Wall thickness of vessels varies accordingly with the thinnest measuring 4mm and the thickest up to 11mm, although vessel walls tend to vary by up to 3mm on some pots with thickening of the wall typical around the carination and the curving base of the vessel.

Numbers and Distribution

A total of 49 Early Neolithic vessels could be identified. No certain matches could be made between sherds or pots from different pits. The Carinated Bowl pottery shows a clear patterning in its distribution on the site. All the material occurs in Area 2 and is usually within the fills of midden pits in clusters 1 and 2, together with some in outlying pits such as F1021 and F1077. Occasional Early Neolithic material occurs as residual material as in the fill of ring ditch 2 (pot 21; sherds of plain, probably globular vessel, not illustrated) and the tree throw pit.

Contexts for illustrated sherds

Figure 27
Pot 7: Pit F1285 – associated with Structure 2
Pot 17: Pit F1245 – associated with Structures 1 and 2
Pot 24: Pit F1043 – associated with Structure 3
Pot 38: Pit F1127 – associated with Structure 3
Pots 54, 55 and 56: Pit F1079 – associated with Structure 3
Pot 68: Pit F1045 – midden pit associated with Structure 3

Figure 28
Pot 25: Pit F1043 – associated with Structure 3
Pot 42: spread of material south of pits F1245 and F1247, associated with Structure 3

Figure 29
Pot 35: Pit F1127 – associated with Structure 3
Pot 11: Pit F1021, outlying

Impressed Ware

A small assemblage of Peterborough Ware, or Impressed Ware to give it a more neutral stylistic title, was recovered from a single pit, F1193, situated between Ring Ditch 2 and Midden Pit Cluster 2 in Area 2. Finds of Impressed Ware are relatively rare in the Trent Valley although recent finds of such material have been made at Melbourne of the Ebbsfleet Ware sub-style (Courtney 1973), and at Willington Quarry where ceramics of the Fengate/Mortlake and Ebbsfleet sub-styles were recovered (Beamish 2001; 2009), the latter with associated radiocarbon date ranges spanning *c.*3510-2510 cal BC. Further afield Impressed Ware of the Mortlake style has been recovered form the nearby site at Wigber Low as well as other Peak District sites such as Fox Hole Cave (Bramwell 1971, 13-15) and Wormhill (Radley and Plant 1967, 152) whilst possible Ebbsfleet Ware has been found at Reynard's Cave (Kelly 1960) and Rain's Cave (Ward 1889).

Fabric

Impressed Ware ceramics have a distinctive fabric being hard, thick-walled pots of varying size, with some large and coarsely made and others small and more finely made. They were made using the coil technique and contain prepared angular crushed stone inclusions of quartz and occasionally other stone. They can be evenly or unevenly fired and the stone inclusions can often be seen erupting on the surface.

Form

As with Impressed Ware ceramics from elsewhere in the British Isles the material from this site indicates highly decorated vessels which utilise fingernail impressions and comb decoration. No base sherds were identified and so it is not possible to reconstruct a complete profile for any vessel. Rims from pots 62 and 63 indicate vessels with a 'T' profile decorated with parallel lines of comb impressions along the top of the rim and their inner edge (Fig. 30; Plate 5). The internal surface at the neck of pot 62 is decorated with horizontal parallel rows of fingernail impressions whilst the outer surface of the neck is plain. This material is in keeping

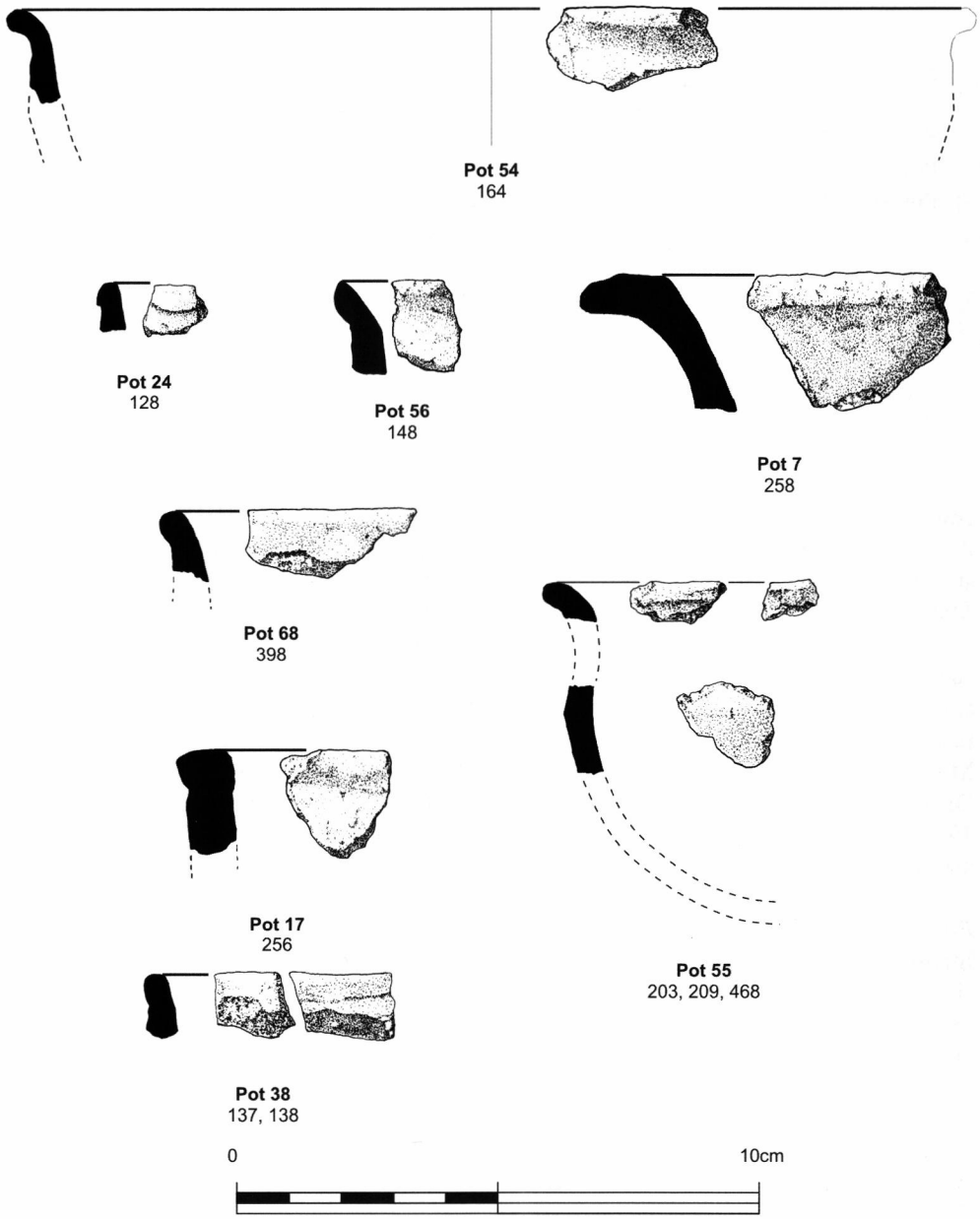


Fig. 27: Early Neolithic Ceramics (1)

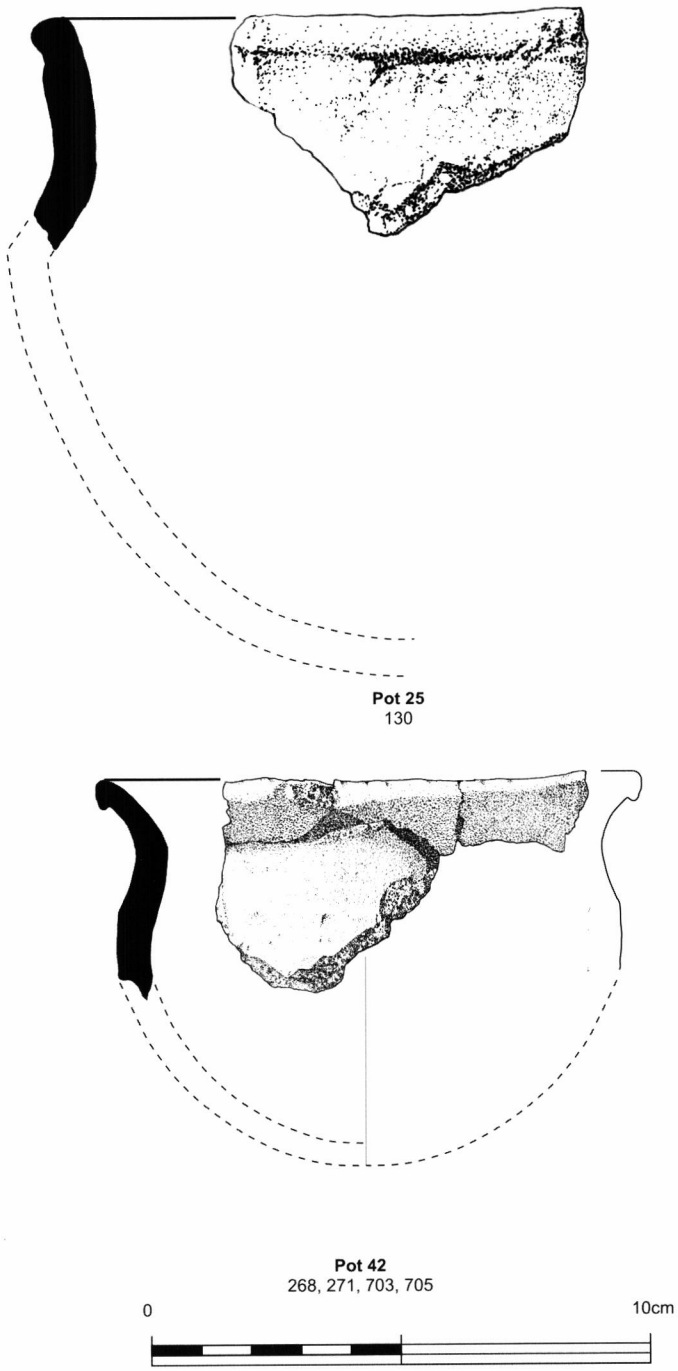


Fig. 28: Early Neolithic Ceramics (2)

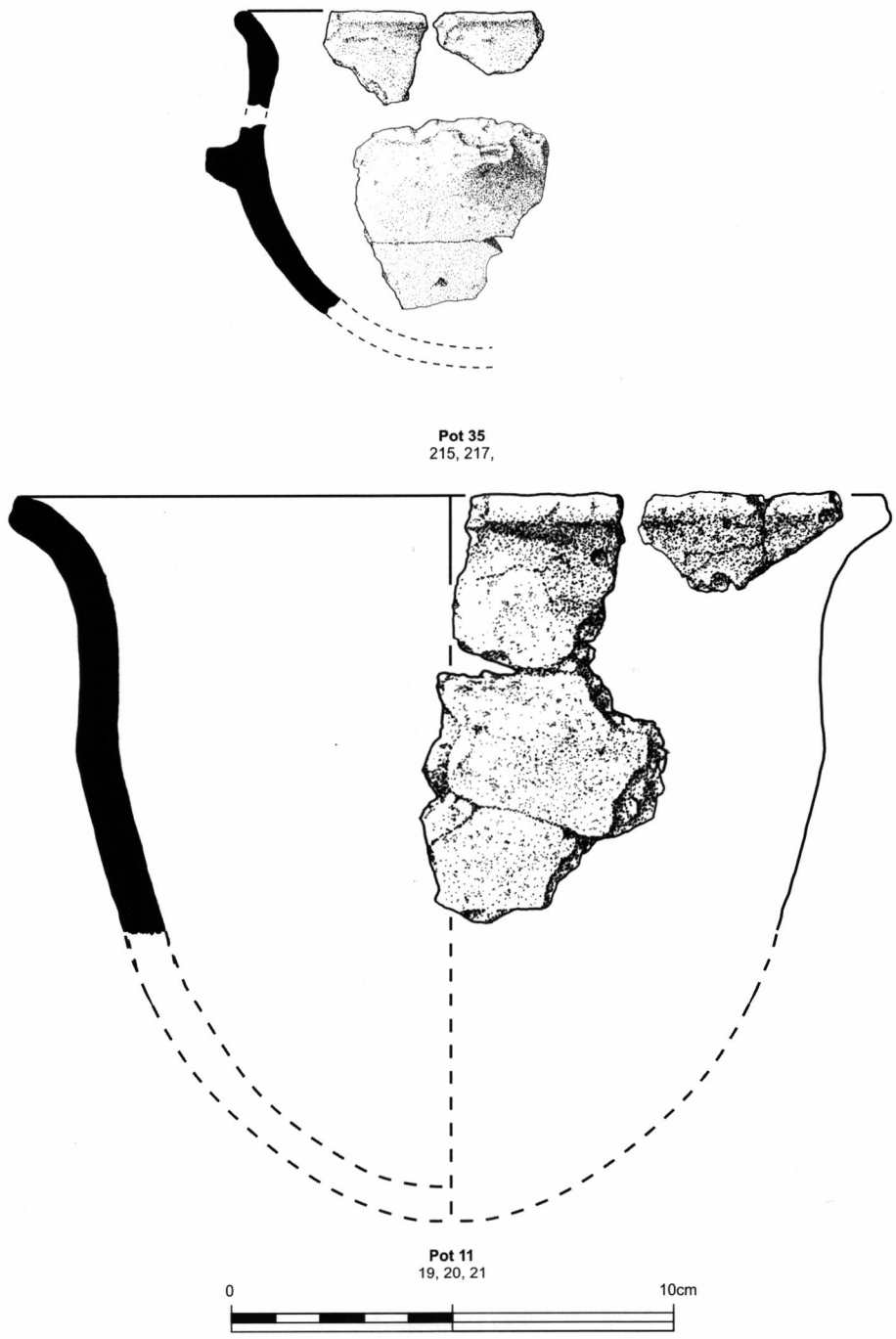


Fig. 29: Early Neolithic Ceramics (3)

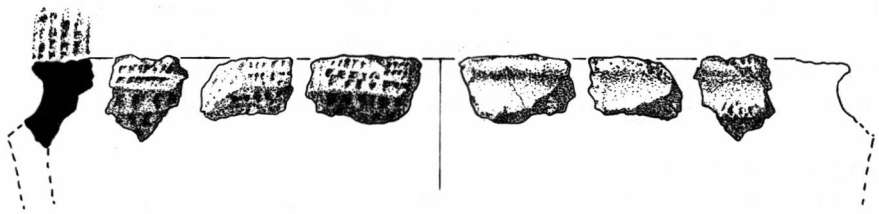
with other sherds of this ceramic tradition from the region including those from the Willington Quarry site (Wheeler 1979). The few rims that provide information on internal rim diameters show an internal diameter of up to 250mm although some vessels are smaller than this. Wall thickness of vessels varies from 5mm to 12mm, although they can vary by several millimetres on individual pots with wall thickening typically around the vessel's shoulder.

Numbers and Distribution
A total of five Impressed Ware pots can be identified from pit F1193, which is situated on its own between the Early Neolithic midden pits associated with Structure 3 and Ring Ditch 2.

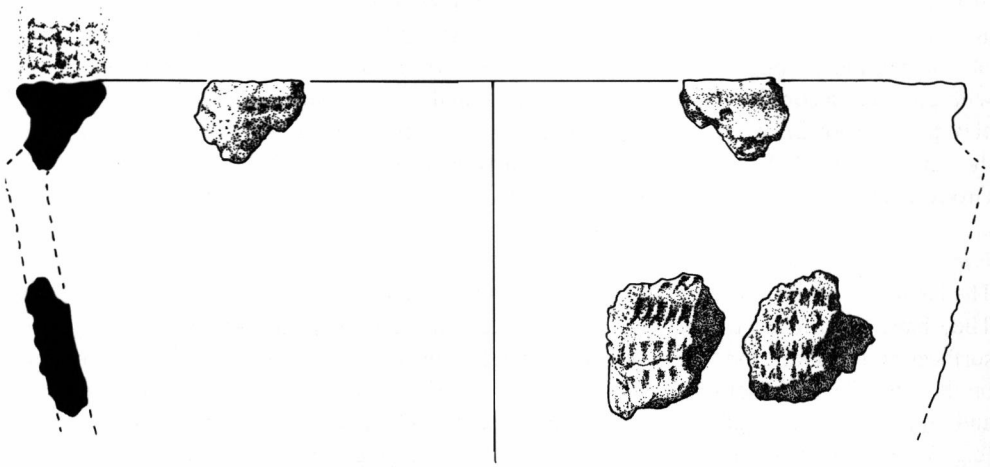
Early Bronze Age Ceramics
Ceramics from cremation pit F1113 included Early Bronze cremation urns as secondary insertions into a pit containing an earlier pot that has Grooved Ware affinities (Fig. 31.1a and 1b). This latter pot can be considered to be a form of 'Neolithic-derivative' pottery in use during the Beaker-Early Bronze Age period (Marshall *et al.* forthcoming for discussion). Finds of Grooved Ware-related ceramics are relatively rare in the Trent Valley and its tributaries and its chronology and use remains poorly understood (Gibson 2002b). These sherds from Mercia Marina although not Grooved Ware *sensu stricto* show clear evidence for some pots with grooved decoration on their outer surfaces, and in one case dimples suggesting applied clay pellets (pot 2), while fingernail impressions are present on pot 4 (Fig. 32). This said, the ceramic vessels from pit F1113 are of Early Bronze Age date but their ancestry is with Grooved Ware forms and certainly not that of the Beaker tradition.

Fabric
The Neolithic-derivative Early Bronze Age ceramics are from well-made pots of varying size. They have been made using the coil technique and are burnished on their inner and outer surfaces and contain stone inclusions more finely crushed than the earlier Neolithic ceramics on the site. The inclusions can be of quartz or fine river-rolled stones usually between 1mm and 3mm across although there is the occasional pot where some larger inclusions are noted (e.g. 31, not illustrated) that can be up to 7mm across. Firing of these pots is not always even, although this may have been deliberate in order to give the outer surfaces their distinctive red-brown colour, whilst the inner core can sometimes be black and the inner surfaces red-brown or brown.

Form
The base sherd from pot 1 indicates a flat-based urn-shaped vessel with applied perforated lugs, while the rim sherds thought to be from the same pot indicate a vertical rim implying a bipartite vessel. A bipartite urn-shaped form can also be identified for pot 4, while a flat-based flared vessel of probable bipartite form can be assigned to pot 78 (Plate 4). Both of the latter vessels contained cremated human bones and have clearly been used as funerary urns with pots 78 and 4 associated with Ring Ditches 1 and 2 respectively. The small size of sherds makes exact classification difficult but the arc of dimples for clay pellets on pot 2 and perforated oval lugs on pot 1, together with their bipartite form, suggest these vessels are of typical Early Bronze Age forms, however they do show traits which could be relate them to the Durrington Walls sub-style of Grooved Ware. Undecorated tub and upright vessel forms identified in this assemblage (pots 3 and 31) have analogous forms found amongst Durrington



Pot 62
317, 390, 391
Indeterminate rim diameter.
Interior shown to left, exterior to right.



Pot 63
211, 392, 471
Interior shown to left, exterior to right.

Fig. 30: Impressed Ware

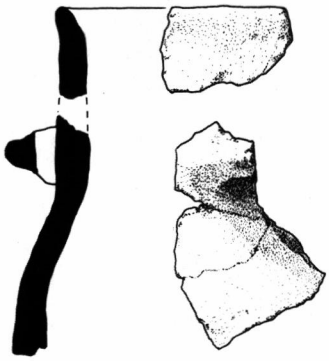
Walls assemblages (e.g. Carnaby Top and North Carnaby Temple, East Yorkshire, Manby 1975). Grooved decoration and a suggestion of lozenge motifs on some sherds associated with pot 52 (Fig. 31) implies parallels with Smith's 'Clacton' style (Smith 1956) whilst the flat rim and horizontal line of fingernail impressions below the rim on pot 4 recall the Woodlands

Plate 4: Mid-Late Neolithic Impressed Ware rim sherds. Only one feature on site produced material from this period, but it provides a link between the more substantial Early Neolithic and Early Bronze Age archaeology and indicates a long history of activity on the site.

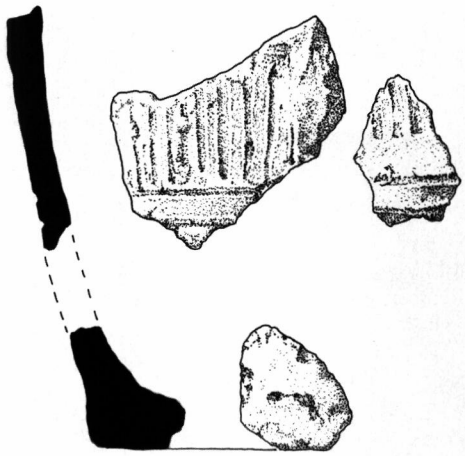
style. This range of Grooved Ware-related motifs is in keeping with styles known to have been present in the Trent Valley including the material from Willington Quarry (Manby 1979). Therefore, there are good Neolithic precursors for the motifs that were later employed in the Early Bronze Age.

Numbers and Distribution

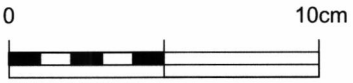
A total of seven Early Bronze Age pots can be identified comprising 54 sherds. Cremation pit F1113 had a primary fill containing fragments from pot 2 (Fig. 32). Pot 78 (Plate 4) containing a cremation was subsequently inserted into this feature. Some time later the cremation pit was reopened and a third vessel, pot 1 (with cremated remains adhering to the interior) (Fig. 31), was inserted. Although these pots can be classified as Early Bronze Age vessels on account of their form and the associated radiocarbon dates, pots 1 and 2 reveal decorative affinities that relate them to Late Neolithic Grooved Ware ceramic styles and as such may be derivative from Late Neolithic traditions (see above). The possible Clacton style Grooved Ware sherds from pot 52 (Fig. 31) were from the unstratified overburden. It is relatively unusual for Grooved Ware-related ceramics to be associated with human cremations but it has been noted before in Cheshire at Sandpit Field, Eddisbury, where a large urn associated with cremated bone was found in 1851 (Varley 1950), and subsequently identified as belonging to the Durrington Walls sub-style of Grooved Ware (Longley 1987, 52). A number of other urns also found at the site perhaps indicated a destroyed round barrow. This recalls the situation at both Willington Quarry and Mercia Marina where ceramics with Grooved Ware-related decoration are associated with cremations and ring ditches which may be all that survived of the barrows which may have once covered these burials.



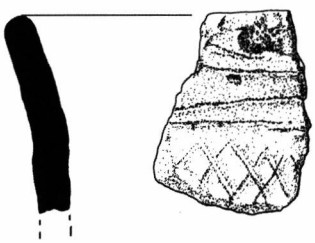
Pot 1a
72, 86
It is not certain that the rim sherds and body/base sherds are definitely from the same vessel and so are not shown joined.



Pot 1b
59, 67, 79
It is not certain that the rim sherds and body/base sherds are definitely from the same vessel and so are not shown joined.

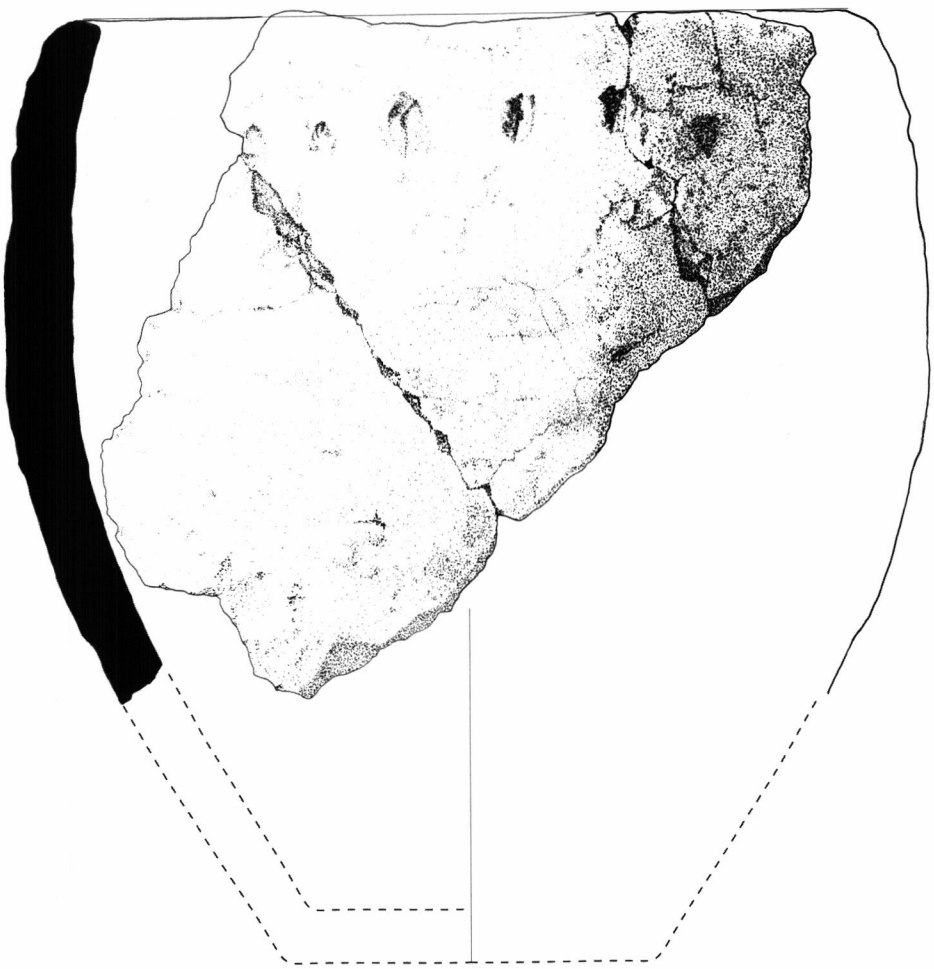


Pot 15
103



Pot 52
733

Fig. 31: Early Bronze Age Ceramics (1)



Pot 4
735, 737, 738

Pot 2

Fig. 32: Early Bronze Age Ceramics (2)

Plate 5: Basal remains of secondary cremation vessel (Pot 78) (copyright Jenny Jones, ASDU).

Indeterminate Ceramics

Area 2 produced sherds from an additional nine pots although their small size and poor condition was such that they could not be ascribed to any particular pottery style (Fig. 33). However, as most came from features associated with Neolithic activity it is thought likely that they belong to Neolithic period vessels but whether early or late remains undetermined even when their fabric is taken into consideration. Details of these vessels and their corresponding sherds and contextual associations are provided in the archive.

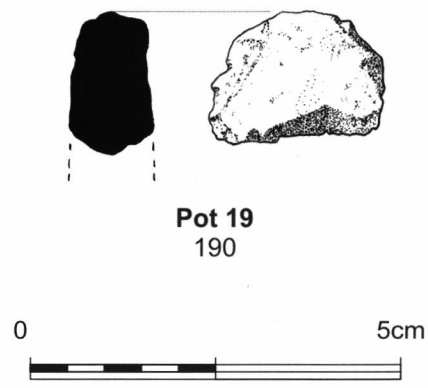


Fig. 33: Indeterminate rim sherd from Pit F1263, Area 2.

Deverel-Rimbury Ware

Deverel-Rimbury Ware is the name given to a complex range of Middle Bronze Age ceramics dating from *c.*1400-1000 cal BC (Gibson and Woods 1997) which derive typologically from earlier Bronze Age urns (Barrett 1976; Barrett *et al.* 1978). Such vessels can be found on burial and settlement sites. Their distribution extends across southern England and the Midlands and has been the subject of an in-depth study in the East Midlands (Allen *et al.* 1987). Further north the ceramics of the later second millennium cal BC tend to have less decoration and, though of similar form, the equivalent but rather more crude style is usually referred to as Flat Rimmed Ware (Hedges 1975). Deverel Rimbury Ware is characterised by situlate and bucket urns with finer, smaller globular urns. Decoration includes applied cordons positioned horizontally and vertically, together with applied zig zags and fingernail and fingertip impressions (Gibson and Woods 1997). Thin-section study of the inclusions in Deverel-Rimbury Ware from the East Midlands has shown them to include grog as well as crushed quartz and shell. The material from Mercia Marina conforms to these general characteristics with cordoned decoration and the use of grog and quartz filler.

Fabric

The coarse fabrics all contain crushed stone inclusions, usually being <4mm across, and occasional grog that is <6mm across, and some organic inclusions are evident. These inclusions have clearly been specially prepared for the purpose and are made out of either sandstone or quartz. Fabrics are usually evenly fired throughout making the pots strong and durable. Both thick and thin-walled vessels are evident with most of the material ranging between 8mm and 13mm in thickness. Pitted surfaces are common where organics have burnt out during the firing process. Consistent colouring on most pots indicates an even firing process which is likely to have taken place in an oxidising atmosphere given the bright orange colour of many of sherds. Surfaces are generally orange-brown in colour and most are at least lightly burnished, with some grass-wiping evident. Organic residues survive on all four rim sherds from pot 74 suggesting the contents of the vessel has bubbled up to the rim. The presence of the residue suggests a domestic function for this pot.

Form

The vessels are all hand built and are of bowl, situlate or bucket shape typically with upright flat rims or an internally beveled rim as in the case of pot 74 (Fig. 34). Pot 77 is undecorated whilst pot 75 has possible thumbnail impressions on its rim and pot 74 has occasional fingernail impressions around the neck of the vessel. Pot 76, however, is a heavy bucket-shaped vessel with applied cordon that is most probably horizontally placed around the upper part of the vessel. The body of the vessel also has two lines of cord, or possibly comb, impression. The rim of the vessel is flattened and plain although it protrudes slightly into the interior of the vessel to create a lip where it has been pinched in.

Numbers and Distribution

About 80 sherds plus crumbs of Deverel-Rimbury Ware pottery was found in an isolated pit F003 in Area 1 with at least four different vessels represented.

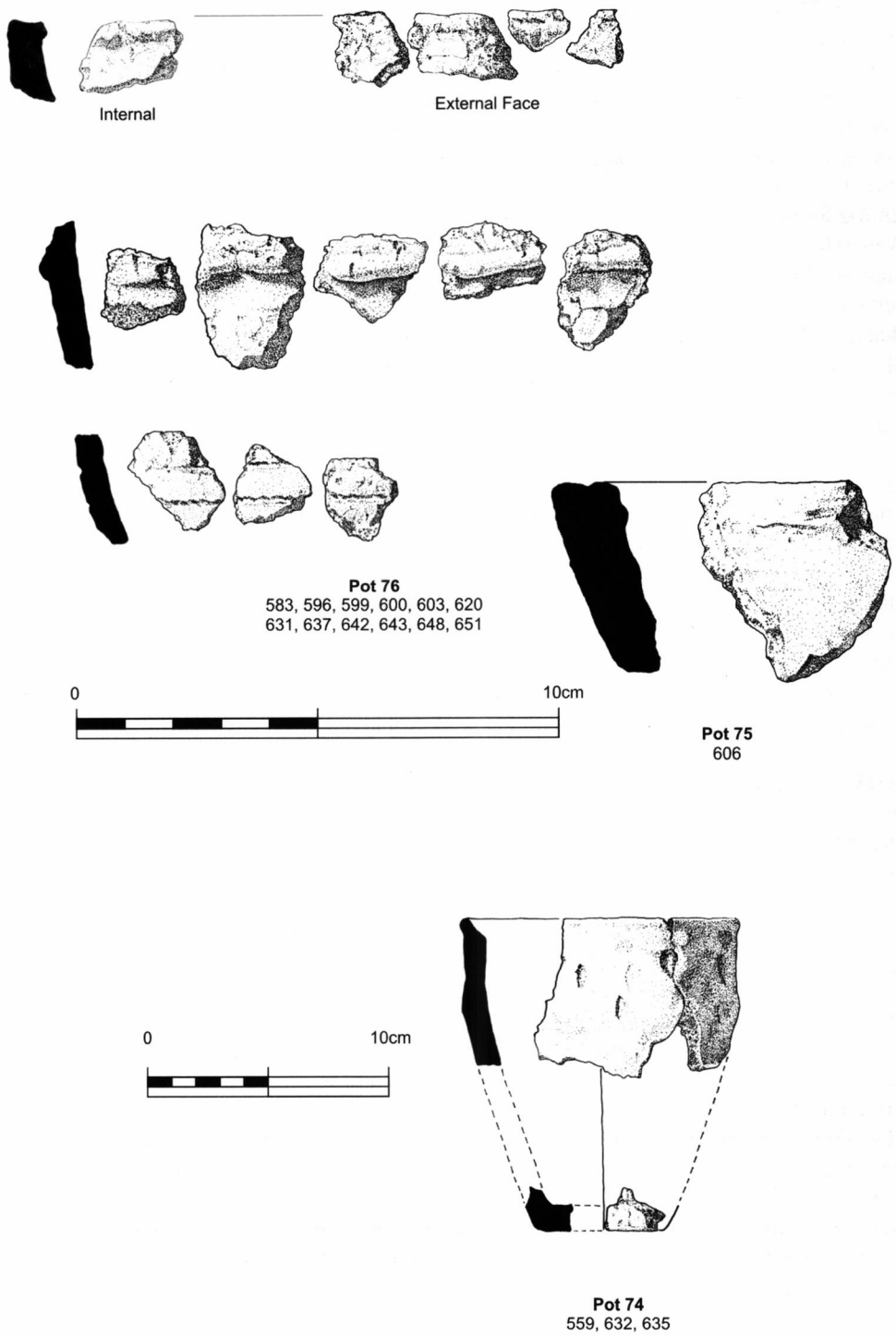


Fig. 34: Deverel Rimbury ware

First Millennium cal BC Ceramics

Two vessels could be ascribed to a 1st millennium cal BC date, although the few surviving sherds allow little to be said about these unremarkable vessels. They are likely to date to the Iron Age on the basis of their coarse fabric and the barrel or bucket shape of pot 72. They do, however, compare with the Iron Age material recovered from Willington Quarry (Elsdon in Wheeler 1979). The fabric and form of pot 72 equates most closely with the fabric termed 'A Ware' by Elsdon whilst pot 73 does not appear to fit quite so well with the fabrics recognised by Elsdon, although the nearest analogy would be Elsdon's 'E Ware'. Elsdon's 'A Ware' is described as, "A very coarse fabric, usually soft, red to brown with dark grey core and often dark grey internally. It has large (6mm) white quartz filler which protrudes through the bumpy surface. .....rarely it has finger tip decoration, and the surface is normally very uneven" (Elsdon 1979, 162).

Fabric

Pot 72 has a crumbly coarse fabric and river rolled stone inclusions as well as crushed stone inclusions and possibly some grog, typically <7mm across. The core centre is sometimes a dark grey suggesting slightly uneven firing. Pot 73 is slightly more finely made being a thin-walled vessel that has been evenly fired throughout. The vessel wall averages 5mm thick and the fabric contains fine crushed stone inclusions <3mm across.

Form

Both the vessels are hand built and pot 72 is a large flat-based substantial vessel probably of barrel or bucket shape. Pot 73 is a smaller thin-walled vessel with a single line of twisted cord decoration visible on its inner surface but there is insufficient of the pot surviving to reconstruct its profile.

Numbers and Distribution

Seventeen sherds representing two late prehistoric vessels of probable 1st millennium cal BC date were found in pit F173, a truncated feature which was associated with the entrance into the rectilinear ditch-defined enclosure in Area 1.

PLANT MACROFOSSIL ASSESSMENT

By Helen Ranner

Introduction

Flots were submitted from bulk samples taken from the fills of a range of contexts: midden pits (contexts 003, 173, 1021, 1079, 1043, 1077, 1211, 1285, 1193 and 1159); a hearth (context 1057); Ring Ditch 1 (contexts 1258 and 1263); cremation pits (contexts 1109 and 1113); post-holes associated with Structure 4 (contexts 1068, 1180, 1182, 1184 and 1186); a midden pit containing pottery (context 1045); a fill within a tree-throw feature (context 1253); and a pit within a pit alignment (context 159).

Method

The flots were examined at ×40 magnification. Fourteen additional samples of material considered to represent deposits with a significant relationship to features, were also scanned. The soil from this site is of a free-draining nature, therefore only carbonised plant material will have been preserved; any uncharred plant remains would be later intrusive material and have not been included in this assessment. Identification of the charred plant remains was undertaken by comparison with modern reference material held in the Environmental Laboratory at Archaeological Services Durham University. Plant taxonomic nomenclature follows Stace (1997).

Results

The flots were generally small in volume (<5 - 75 ml) and dominated by charcoal with occasional clinker. Coal was present in midden context (1077), and indeterminate fragments of calcined bone were recorded in a cremation pit, context (1109).

Charred plant remains were recorded in five contexts. Wheat grains were present in midden contexts (003) and (1077), and a cremation pit context (1113). Hazelnut shells were recorded in a midden pit, context (1045), and in the pit containing an inserted cremation, context (1113); and plant tubers were present in contexts (003) and (159). Modern plant material, consisting of roots and a few uncharred seeds, was occasionally present. The results are presented in Table 4, which also indicates the contexts containing charcoal fragments suitable for radiocarbon dating.

Discussion

The flots were dominated by small quantities of charcoal with occasional clinker. Scanning of the charcoal indicated that most was derived from oak, however, charcoal from other woodland taxa was present, and suggests the proximity of a mixed woodland.

Charred plant macrofossil remains indicate that wheat was used in all the main phases of site activity. Wheat was recorded in the Neolithic midden pit F1077, the Early Bronze Age cremation pit F1113 and the mid Bronze Age pit containing Deverel-Rimbury pottery F003. But the absence of chaff prevents determination of which species of wheat was present, and forestalls any speculation regarding cereal processing activities. Hazelnuts were also being used both during the Early Neolithic and Early Bronze Age periods, and evidence for exploitation of this wild resource is recorded commonly on sites throughout prehistory. Plant tubers were found in contexts (003) and (159) which may be false oat-grass tubers, frequently found on Neolithic and Bronze Age sites, associated particularly with cremation deposits (Robinson 1988). However, these tubers lack the characteristic surface ribbing associated with this species, and therefore identification is uncertain.

Cremation pit, context (1109), contained wheat and hazelnut shell fragments and was the richest plant macrofossil sample. This may indicate use of these foods in association with a cremation ceremony, either as votive offerings or burnt following ritual feasting.

Feature fill		midden	pit	midden	midden	midden	midden	hearth			post-hole	midden	midden	crem. pit	crem. pit	midden		post-hole		
Context		003	159	173	1021	1043	1045	1057			1065	1077	1079	1109	1113	1159		1180		
Sample		1	13	20	44	6	70	14	-	-	28	10	15	61	86	19	-	1	-	-
Subsidiary samples		-	-	-	-	-	-	-	22	25	-	-	-	-	-	-	36	-	58	64
Material available for C14 dating		✓	-	-	-	-	✓	✓	✓	-	✓	✓	✓	-	✓	-	✓	✓	-	-
Volume processed (l)		25	10	5	5	10	?	5	-	-	10	5	5	5	20	5	-	5	-	-
Volume of flot (ml)		20	<5	<5	<5	<5	<5	75	-	-	10	<5	5	5	50	<5	-	5	-	-
Volume of flot assessed (ml)		20	<5	<5	<5	<5	<5	75	-	-	10	<5	5	5	50	<5	-	5	-	-
Flot matrix (relative abundance)																				
Bone (calcined)	indet. frag.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Charcoal		1	1	1	1	1	1	2	1	2	1	2	2	2	2	2	1	2	-	1
Clinker		-	1	1	-	-	-	1	-	-	1	1	-	1	1	1	-	-	-	-
Coal		-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Roots (modern)		1	1	-	-	-	-	1	-	-	1	1	1	1	1	1	-	1	-	-
Uncharred seeds		1	-	1	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	-
Charred remains (total counts)																				
(c) Triticum spp (wheat species)	grain	2	-	-	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-
(c) Cerealia indeterminate	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-
(t) Corylus avellana (Hazel)	nutshell frag.	-	-	-	-	-	5	-	-	-	-	-	-	-	3	-	-	-	-	-
Indeterminate tubers		1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Feature fill		**post-hole**				**post-hole**	**post-hole**	**midden**		**midden**	**tree-throw pit**	**ring-ditch**			**ring-ditch**		**midden**		
Context		1182				1184	1186	1193		1211	1253	1258			1263		1285		
Sample		21	-	-	-	100	16	31	-	12	91	70	-	-	72	-	94	-	-
Subsidiary samples		-	132	133	134	-	-	-	53	-	-	-	26	31	-	32	-	118	119
Material available for C14 dating		✓	✓	-	-	-	✓	✓	✓	-	✓	✓	-	-	✓	✓	✓	-	-
Volume processed (l)		5	-	-	-	5	?	10	-	10	1	10	-	-	10	-	5	-	-
Volume of flot (ml)		<5	-	-	-	<5	<5	<5	-	<5	<5	10	-	-	10	-	<5	-	-
Volume of flot assessed (ml)		<5	-	-	-	<5	<5	<5	-	<5	<5	10	-	-	10	-	<5	-	-
Flot matrix (relative abundance)																			
Bone (calcined)	indet. frag.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Charcoal		1	1	-	1	1	1	1	1	1	1	2	1	-	2	2	2	-	1
Clinker		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coal		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roots (modern)		-	-	-	-	1	-	1	-	-	-	1	-	-	1	-	1	-	-
Uncharred seeds		-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-
Charred remains (total counts)																			
(c) Triticum spp (wheat species)	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(c) Cerealia indeterminate	grain	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(t) Corylus avellana (Hazel)	nutshell frag.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeterminate tubers		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4: Data from plant macrofossil assessment.
[c-cultivated plant; t-tree]. Relative abundance is based on a scale from 1 (lowest) to 5 (highest)

POLLEN ASSESSMENT

By Phillip Allen

Methods

Eleven samples were selected from the site for pollen assessment. Approximately 2g of sediment was used with one Lycopodium tablet (batch number 938934) added prior to chemical preparation for the purposes of calculating pollen concentrations as described by Stockmarr (1971). Chemical preparation of the samples followed the acid digestion procedure described by Barber (1976) with an added density separation stage to concentrate the pollen, which followed the J.J. Lowe and N. Branch (unpublished) Royal Holloway and Bedford New College method. Further details of the laboratory procedure are contained in archive. All counts were undertaken using a Leica DME compound microscope at a magnification of x400. A standard assessment count of the area of one 22x22 mm cover slip or a count of 300 grains of pollen and non-pollen palynomorphs was employed. The count also included the exotic spore of Lycopodium to give an indication of the pollen concentration per level. Identification of pollen grains and spores was aided by the use of published identification keys, including Faegri and Iversen (1989), Moore *et al.* (1991), van Geel *et al.* (1998), Hans-Jürgen Beug (2004) and by comparison with pollen reference material (type slides) held by ARS Ltd.

Results

Examination of pollen from the site revealed sediment with relatively low pollen and non-pollen palynomorphs preserved and results of the assessment are presented in Table 5.

Although the slides contained a large amount of degraded organic material this did not impede identification of pollen and non-pollen palynomorphs. However, five contexts contained such low concentrations that less than ten pollen grains were identified. The range of arboreal pollen identified was limited and consisted of *Alnus glutinosa*, *Quercus*, *Betula*, *Ulmus* and *Pinus*. The most frequently recorded arboreal type was *Alnus glutinosa*. *Corylus avellana*-type along with *Calluna vulgaris* represented the shrub communities. A suite of pollen types associated with human activity and disturbed ground was also recorded and included *Plantago lanceolata*, Ranunculaceae, Chenopodiaceae, *Avena*-type and *Hordeum sativium*. The number of other herbaceous types was relatively limited and included Poaceae, Caryophyllaceae, Asteraceae, Rosaceae, *Galium*, *Lactuceae* and *Taraxacum officinale*. Poaceae was the most frequently recorded pollen type throughout the assessment. Indicators of wet/damp ground conditions were represented by Cyperaceae, *Sparganium erectum* and *Myriophyllum verticillium*.

The non-pollen palynomorphs were represented by *Sphagnum*, *Polypodium*, *Pteridium*, *Sordaria*, *Podospora* and the presence of Types 207 and 88.

Microscopic charcoal (both < and > 50 microns) was recorded in relatively high frequencies in every level assessed.

Interpretation

Early Neolithic Contexts

Five of the six samples analysed from Neolithic midden pits contained very little pollen evidence from which to draw conclusions. However F1045 showed low frequencies of *Alnus glutinosa* (alder), *Quercus* (oak) and *Ulmus* (elm). Alder and oak most likely represent small areas of wetter mixed woodland or woodland stands that occur around the site.

Shrub and woody climber types were limited to *Corylus avellana*-type (hazel) and *Calluna vulgaris* (heather). Hazel is a versatile plant that can inhabit numerous environments and indicates a range of possible landscapes. The hazel from Mercia Marina may represent an understorey component of open woodland around the site. However, the presence of hazel from stratigraphic levels with relatively limited representations of arboreal types most likely indicates open or cleared environments within and around the site. Farming activity such as grazing and arable agriculture may be a likely cause of the open areas and hazel is a frequent component of managed hedge communities, although natural openings cannot be dismissed entirely for promoting the hazel. The presence of hazel could also represent scrub communities on river terraces and overbank deposits around the area, as hazel is tolerant of damp ground conditions. The low frequency of the recorded heather species may be a response to the local ground conditions as these types are common on all but very acidic, very dry or very waterlogged soils (Clapham *et al.* 1957; Stace 1997) and the possibility of periods of prolonged wetting and drying by fluvial activity cannot be ruled out.

Ranunculaceae (buttercup family) and Chenopodiaceae (goosefoot family) are also present as indicators of human-disturbed ground, while the presence of *Hordeum sativum* (barley) shows arable agriculture was being practiced. A large amount of grasses and sedges were also present indicating some open land as well as waterlogged areas.

Sordaria and *Podospora* are types of spores which were present within the Early Neolithic sample and indicate varied spore and fungi communities on and around the site. *Sordaria*, a microscopic fungus commonly found on the faeces of herbivores, is further evidence for pastoral activities at the site, and additional evidence for pastoral and/or domesticated animals is provided by the presence of *Podospora* (van Geel, 1998; 2006)

Bronze Age Contexts

The Bronze Age pollen evidence is predominantly represented by context 1258, a middle fill from Ring Ditch 2 which dates from later usage of the monument or possibly its end use. *Alnus* (Alder) is again present, indicative of wet ground, and also *pinus* (Pine). The pine was a single undamaged grain recording which most likely represents deposition via pollen rain and, therefore, may not be related to the woodland composition of the site.

As with the Early Neolithic contexts, there are a number of indicators of disturbed ground activity: *Hordeum sativum* (barley) which also indicates the presence of arable agriculture in the local area, *Plantago lanceolata* (Ribwort Plantain), Ranunculaceae (buttercup) and *Linum* type (flax). The flax is possibly *Linum cartharticum* (fairy flax) which was often used for dying fabrics, although the possibility of the fairy flax being a natural component of the vegetation composition cannot be ruled out.

Spores *Sordaria* and *Podospora* were also present indicating the presence of domesticated animals alongside the arable agriculture.

Willington	Context										
	1045	1263	1021	1043	1253	1285	1258	1077	1193	1211	1159
Arboreal											
Alnus	3	7			1		1		1		1
Betula					1						
Pine							1				
Quercus	4			2	1						
Ulmus	2										
Shrubs dwarf shrubs											
Corylus avellanaI-type	2	3			1			1	1		1
Calluna vulgaris	1				4		1				
Disturbed ground human activity											
Avena type					2						
Hordeum sativum	1						1				
Plantago lanceolata							3				
Chenopodiaceae	2	3	1		1			1			
Ranunculaceae	1				1		1				
Linum type		3	1				1				
Artemisa					1						
Grass and Herbs											
Poaceae	10	13	7		28		27		4	1	3
Asteraceae		1	1		3		2		1		
Caryophyllaceae		1			2						1
Rosaceae					1						
Galium	1										
Wet damp ground and aquatics											
M verticilium							1				
Cyperaceae	4	11	1		3		1		1		
Sparganium erectum		1			13						
Decay Resistant											
Lactuceae	1	16	4	1	12		14		1		
Taraxacum	6	15	9		17	3	13	4	3		2

Willington	**Context**										
	1045	1263	1021	1043	1253	1285	1258	1077	1193	1211	1159
Total Pollen											
All Pollen	38	74	24	3	102	3	67	6	12	1	8
Spores and NPP											
Polypodium		1									
Sphagnum							1				
Pteridium	1			1	2						
Sordaria Spore	2	8	6	2	7	1		3	1		2
Podospora					2				1		
T207	2	4	2		2	1		1			2
T88											
Spike charcoal and preservation											
Lycopodium	64	138	68	32	17	47	79	96	81	68	88
C G 50	24	8	12	5	10	32	2	8	9	7	18
C L 50	18	8	8	9	24	23	7	3	9	9	21
UN Organics	2	4	8	6	1	3	7	5	8	8	5
U N S	16	15	11	3	15	5	3	3	4	4	6
Preservation											
WP	3	10	6		15	1	7	2			
C2	11	10	5	1	9		5	2	1		
C3	7	6	3	1	7		4	1	2		
C4	2	4		1	4		4		1		
D5	3	6		1	3		8		1		
D6	2	7	1		6		7	1	3		1
D7	0	0	1		1		3		1		4
BR8	8	5	1		15		2				
BR9	1	2			2		1				1
CR10	24	27	4		38	2	16		2	1	3
Unidentified	11	10	6	2	6		3	2	2	1	1
Pollen Concentration (per g)	11034	9965	6559	1742	111498	1186	15760	1161	2753	273	1689

Table 5: Total pollen and non-pollen palynomorphs count data.

General Overview common to the majority of levels

Taraxacum officinale (dandelion) was frequently recorded and dandelions are common components of pasture and could be related to human activity. However, *Taraxacum officinale* is decay resistant and the high quantities recorded during the assessment may reflect the longevity of preferential preservation rather than human activity. Due to the frequency and quantity of dandelions combined with the limited range of pollen types recorded on the site it is likely that post-deposition erosion of the pollen has occurred

Non-pollen palynomorphs recorded throughout the assessment were comparatively well represented and support the interpretation produced from the pollen identifications. *Sphagnum* (peat moss) is a common component of damp environments and was recorded in low frequency. *Polypodium* (fern family) could be associated with the understory component of woodland or stream banks. Pteridium (bracken) commonly found in woods, heaths and moors but most likely represents an open environment. Non-pollen palynomorphs Type 207 (spore associated with arboreal communities), 88 (unidentified mandibles), Sordaria and Podospora indicate varied spore and fungi communities were present on and around the Mercia Marina site. The identification of Sordaria, a microscopic fungus commonly found on the faeces of herbivores is further evidence for pastoral activities at the site. Additional evidence for pastoral agriculture and/or domesticated animals was provided by the presence of Podospora (van Geel, 1998 and 2006). The microscopic charcoal frequencies were relatively high throughout the assessment indicating fire may have had a consistent presence throughout the site, though determining the extent of the fire or attributing a causational signal to the fire is problematic.

Pollen evidence from Mercia Marina indicates that open, herbaceous, grassland environments were dominant, although some stands of mixed woodland were present but not extensive. There is ample evidence from the arboreal and herbaceous pollen to indicate damp and/or wet ground and that quite possibly waterlogged and/or pooled or standing bodies of water were present. Due to the limited range of identified pollen types it is difficult to suggest a chronology. The majority of analysed samples were from contexts containing 4th millennium cal BC pottery, yet the majority of pollen came from the few samples taken from later deposits. A general lack of trees suggests that the pollen record post-dates the major periods of woodland and relates largely to the Early Bronze Age activity when an open landscape was being farmed via grazing and cereal production.

TIMBER REPORT

By Jennifer Jones

Examination

Around 60 fragments of wood were examined, all deriving from context 1254, a middle fill of the suspected tree-throw pit F1209. Due to dessication of the wood, it was not possible to observe any toolmarks or other evidence of conversion on their surfaces.

Most of the fragments were <200mm long. No evidence of working was found from an examination of the edges, and many pieces appear to be abraded as well as contorted by desiccation. No bark survived. Many pieces were irregularly shaped and elongated, suggesting the weathering of natural fragments - perhaps the residue of a fallen (or possibly felled) tree. Shapes of fragments did not suggest artefacts, or offcuts of such.

Species Identification

Seven of the fragments were sampled for species identification. This was not entirely random, but concentrated on the less contorted pieces, which would give a better chance of identification. Sub-samples were removed, and the wood was partially re-hydrated, using a mixture of water, industrial methylated spirits and detergent (as wetting agents). Following re-hydration, it was possible to cut some sections for species identification, although not the three sections usually required for a positive identification.

Six of the seven samples were identified as *Fagus* (Beech) with varying degrees of confidence. It was not clear whether the remaining sample was *Fagus* or *Quercus* (Oak), although the balance of probability suggests that it too is *Fagus*. The same species identification for all seven of the samples adds further support to the notion that these are the natural, unworked remains of a tree.

OSTEOLOGICAL ANALYSIS OF THE HUMAN REMAINS

By Alexandra Thornton

Samples of bone came from nine separate contexts and consisted predominantly of cremated human remains. Seven fragments were identified as possibly animal, which represents a minute amount of the complete assemblage of bone from this site. Two fragments of human bone were unburnt but came from contexts which also contained burnt bone. It is therefore clear that the majority of the bone was human and had undergone the mortuary act of cremation. In order to analyse the assemblage, the guidelines produced by Brickley and McKinley (2004) were followed and Schwartz's 'Skeleton Keys' (1995) was drawn on to confirm skeletal element identification. The type of deposits, the level of disturbance to the site, the amount of bone fragmentation due to this disturbance, the demographic data, the pathological data, the colour of the cremated bone, the pyre goods and the pyre debris were all analysed.

Type of Deposits

A 'cremation' is often mistakenly recorded as the burnt remains recovered from a deposit. However, a cremation is more precisely the act of burning a body on a pyre and is thus the mortuary rite itself rather than the burnt remains (McKinley 1997, 1998, 2000a, 2000b, 2004). A 'cremation burial' is the cremated bone, pyre goods and pyre debris which have been deposited as a burial, or the cremated remains which are still in-situ on the pyre (McKinley 1997, 1998, 2000a, 2000b, 2004).

The type of deposit in which cremated remains were recovered is demonstrative of the secondary part of the mortuary rite post-cremation. There are various ways to deposit burnt remains including leaving it *in-situ* on the pyre, burying it in an urn or similar container, depositing a small amount (<25g) as a memorial or cenotaph, or placing it in a cremation-related deposit (McKinley 2004: 10).

The cremation rite became more common in the Late Neolithic to Early Bronze Age and cemeteries with large numbers of cremations, often in urns, become known across the British Isles. At the nearby Willington Quarry site, excavations in 1970-2 yielded prehistoric pottery related to funerary monuments (Wheeler 1979).

At the Mercia Marina site, an urned burial, context (1165), was recovered which contained a large amount of cremated material (Table 6). Similarly, although to a much lesser extent, context (1109) revealed a smaller amount of cremated remains. From the rest of the contexts, the fills of pits and a post hole (Table 7), <25g worth of bone was recovered, suggesting that these deposits were unrelated to the Early Bronze Age cremation activity on site.

	Weight of bone in grams per sieve aperture sizes					
Context	**<1mm**	**1-5mm**	**>5mm**	**Total weight**	**Percentage weight of total assemblage**	**Max. fragment size (length x width x depth in mm)**
1031	0.00	0.00	6.83	6.83	1.15	22 x 19 x 2
1043	<0.01	0.00	0.00	<0.01	<0.01	1 x 2 x 1
1045	<0.01	0.00	0.00	<0.01	<0.01	1 x 1 x 1
1079	0.00	1.62	0.36	1.98	0.33	10 x 8 x 4
1107	0.00	0.59	2.75	3.34	0.56	16 x 10 x 4
1109	0.00	3.24	21.97	25.21	4.26	36 x 9 x 2
1165	11.08	105.68	461.94	552.02	93.36	32 x 25 x 2
1211	0.00	0.00	1.09	1.09	0.18	22 x 12 x 6
1254	0.00	0.81	0.00	0.81	0.14	16 x 15 x 50

Table 6: The weight in grams of all the bone (burnt and unburnt) recovered from Findern Road, Willington.

Context	Description of Context
1031	Fill of a disturbed pit
1043	Fill of a pit
1045	Fill of a pit
1079	Fill of a pit
1107	Fill of a post hole
1109	Fill of a cremation ?pit
1165	Fill of a cremation urn
1211	Fill of a pit
1254	Fill of a disturbed pit

Table 7: Context numbers with their descriptions.

Disturbance

Any disturbance of the bone, whether pre- or post-deposition, affects the amount of bone which has been lost and increases bone fragmentation. The site was heavily truncated by modern ploughing and therefore the bone recovered was badly disturbed and more fragmentary than from a site without post-depositional disturbance. One context (1254) was further disturbed through tree root action. Context (1031) was also disturbed by animal burrowing.

Bone Fragmentation

The bone was sieved through three sieves with different sized apertures (<1mm, 1 to 5mm, >5mm). Also the total weight of the cremated bone for each context was gathered, as was the size of the largest bone fragment. There was very little recovered from the sieve with apertures measuring <1mm and most of the bone fragments were larger than 5mm in size, which is still relatively small. These results illustrate the difficulty in retrieving very small fragments of bone on site, although it may also suggest that the bone was fairly fragmentary prior to excavation.

Demographic Data

Analysis of cremated bone can occasionally allow the bone to be placed into one of four skeletal categories; the skull, the axial skeleton, the upper limb and the lower limb. Generally the bone fragment most often identified is part of the skull due to its easily discernible features. Upon examination of the assemblage, all bone which could be identified was placed into one of the four categories (Table 8). This table also gives the percentage of the total weight of each of these four categories compared to the total weight of the identifiable bone per context.

	Weight of Identifiable Burnt Bone Fragments in grams								
Context	**Skull**	**% of Total Weight**	**Axial Skeleton**	**% of Total Weight**	**Upper Limb**	**% of Total Weight**	**Lower Limb**	**% of Total Weight**	**Total Weight of Identifiable Bone (grams)**
1031	<0.01	0	0.00	0	2.00	33	4.04	67	6.04
1043	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1045	0.00	0	0.00	0	0.00	0	0.00	0	0.00
1079	0.42	63	0.00	0	0.00	0	0.25	37	0.67
1107	<0.01	0	0.80	29	0.66	24	1.29	47	2.75
1109	4.14	23	0.00	0	7.33	39	7.10	38	18.57
1165	51.51	32	6.61	4	46.36	29	53.22	35	157.70
1211	0.00	0	0.00	0	0.00	0	1.09	100	1.09
1254	0.81	100	0.00	0	0.00	0	0.00	0	0.81

Table 8: The weight in grams of the identifiable fragments of burnt bone.

Table 8 shows that bone from contexts (1043) and (1045) could not be identified as it was too small. However, at least some bone from all of the other contexts could be placed in one of the four categories.

Table 9 shows that fifteen bone fragments could be identified precisely. There were no duplications of the same fully identified bone from any single context and therefore for each separate context, the minimum number of individuals was only one. This means that from each context at least one individual may have been buried there. Neither were there any bones which could be used to identify sexual dimorphism and therefore it is unknown whether the individual/s were male or female. The only artefact which could be used to give an age estimation was a second pre-molar identified from context (1165). It appeared to be marginally worn suggesting it came from a middle to older aged adult. A middle phalange from the hand identified from this context was fully formed and fused confirming that it was an adult.

No typical features which can assist with ageing of a skeleton were observed from the remaining assemblage and therefore it is not clear if the cremated individuals were adult/s or juvenile/s. At best guess, however, it can be presumed from the length, fusion and thickness of the bone, that the majority of the assemblage was adult.

Context	Specifically identifiable burnt bone fragments	Side	Part of bone	Whole/part of section of bone
1107	?Scapula	x	x	Part
1109	Temporal bone of skull	Right	Internal acoustic meatus	Whole
	Middle phalange of hand	Left	All	Whole
	Middle phalange of hand	x	Proximal third	Part
	Capitate	x	Proximal quarter	Part
	Hamate	x	Proximal quarter	Part
1165	Thoracic vertebra	x	Lamina	Whole
	Thoracic vertebra (x2)	x	Facet	Whole
	Vertebra (x3)	x	Lamina	Whole
	Radius	Left	Radial tuberosity	Part
	First Molar or Pre-Molar 2	x	Root and half of crown	Part
1254	?Parietal bone of the skull	x	Cranial suture visible	Part

Table 9: Identifiable fragments of burnt bone.

Pathological Data

The fragmentary and incomplete nature of a cremated assemblage renders the normal recording procedures for pathological data inadequate or misleading, and yet, it is still important to describe any lesions observed upon the bone. No pathology was observed on the bones during analysis but the lack of observable lesions is inconclusive on such small samples.

Colour

The colour of cremated bone reflects the 'degree of oxidisation of the organic component of the bone' (McKinley 2004, 11) which in turn is related to the 'temperature acting on the bone' (McKinley 2004, 11). Bone colour can be used to determine the approximate temperature of the pyre and its efficiency. Most of the bone was white in colour which indicates that it

has been completely oxidised in a pyre over *c.*600°C. Some cremated bone from contexts (1031), (1107), (1165) and (1254) was slightly blue/grey in colour meaning the bone was not completely oxidised and had been in a pyre section burning at less than *c.*600°C.

Dehydration
There was no evidence for dehydration of the bone.

Pyre Goods
No pyre goods were found with the cremated remains from any of the contexts. The inner surface of the skull fragment from context (1254) was partially red whilst the outer surface was white, which may indicate iron leeching from the surrounding soil, or that the fragment may have been positioned next to a piece of iron whilst on the pyre.

Pyre Debris
Charred burnt material was recovered from contexts (1079), (1109) and (1169) and four fragments of possible burnt clay pellets were also found from context (1079). This material may well have come from the pyre and may also indicate that clay was sometimes burnt upon pyres.

Conclusion
The two principal features on site relating to funerary activity are the urned cremation burial within F1113 and the possible cremation remains in F1109.

No fragments of identifiable bone were duplicated in individual contexts and therefore the minimum number of individuals which were deposited in each separate context was one. No sexually dimorphic features were observed on the cremated remains and therefore the sex of the individual/s cannot be determined. No pathological lesions were observed. Only one artefact could be used to make an age estimation. A tooth from (1165), the fill of a cremation urn, was probably from a middle-aged adult. The rest of the contexts also appeared to contain adult bone.

DISCUSSION

The Mercia Marina site has yielded a palimpsest of prehistoric activity ranging from the Mesolithic, and perhaps even the Late Upper Palaeolithic, through to the first millennium cal BC. When viewed alongside the wealth of other remains from nearby sites (e.g. Hill Farm, Willington – Hughes and Jones 1995, 2001; Willington Quarry – Wheeler 1979, Beamish 2001, 2009; Catholme – Buteux and Chapman 2009; Chapman *et al.* 2010), the potential for a regional synthesis now exists. The Trent Valley has clearly formed a focus for settlement from the very earliest Post Glacial through to the present and the remains of different types of activities through successive periods of occupation remain etched into the surface of the sand and gravel river terraces and alluvial valley floor.

This excavation once again demonstrates the archaeological sensitivity and historical significance of the Trent Valley and its ability to provide important insights into the past. One of the key outcomes of this work is the discovery of examples of post-built structures of an Early Bronze Age date alongside burial monuments. The topsoil strip has revealed structures that were not visible as cropmarks and furthermore would have been unlikely to have been

identified using conventional evaluation techniques. Prospecting for small pits and pit-defined features is notoriously difficult and the employment of strip, map and sample conditions provides the most effective means currently at our disposal for discovering these types of remains (Hey and Lacey 2001; Waddington 2008a). It is only when large areas are exposed that these often ephemeral, but important, features can be recognised.

Late Upper Palaeolithic

The possible LUP lithics from the site derive from the sands and gravels and are therefore from a secondary context. Having been transported down the Trent through glacial action these finds are indicative of LUP activity further up the river catchment.

Mesolithic

Mesolithic activity on the site is represented predominantly by the lithic assemblage which was recovered largely as residual material from the fills of later features. The lithics show a reliance on locally sourced raw materials and the recycling of earlier tools. The sole feature which may have a Mesolithic origin is the tree-throw pit, F1063 in Area 2, which contained Mesolithic lithics in its secondary fills. The occurrence of tree-throw pits as Mesolithic features is attested from other sites such as at Mount Sandel in Northern Ireland (Woodman 1985, 125-6), where the excavator also discusses the wider occurrence of tree-throws as Mesolithic features.

Neolithic

Key features relating to the Early Neolithic period are the two clusters of midden pits (clusters 1 and 2) containing Early Neolithic Carinated Bowl pottery. A parallel can be drawn between the Mercia Marina site and the adjacent area of Hill Farm (Hughes and Jones 2001) as well as the nearby Willington Quarry site (Wheeler 1979; Beamish 2001; 2009) which are all located on free-draining, fertile sand and gravel river terraces. This preference for the siting of Early Neolithic settlements in river valleys is attested widely across Britain in areas as far away as the lower Tweed valley and its tributaries (Passmore and Waddington 2009; 2012), East Anglia (Garrow 2007) and central southern England (e.g. Gardiner 1984; Ford 1987; Thomas 1999).

Mid-late Neolithic activity on the site is attested by the single pit feature F1193 which contained the fragmentary remains of at least five Impressed Ware vessels (Plate 5). While this feature is chronologically isolated on this site, Impressed Ware formed a large part of the assemblage from two phases of work at the nearby Willington Quarry (Wheeler 1979; Beamish 2001; 2009) indicating a focus of settlement during the mid-late Neolithic in this area of the mid-Trent Valley. Impressed Ware typically dates to the late 4th and first quarter of the 3rd millennium BC (Gibson 2002a).

The finds assemblage attest the existence of long range exchange networks during the Neolithic, as illustrated by the use of high quality nodular flint in the lithic assemblage, representing contact with eastern Yorkshire or possibly East Anglia. Elsewhere in the middle Trent Valley Group VI stone axeheads have been recorded (Willington Quarry, Wheeler 1979; Beamish 2009) indicating exchange networks extending north-west to the Lake District. Of perhaps more importance, however, is the possibility that the Trent Valley communities participated in the exchange of ideas. Geographically the Trent Valley, and especially the mid Trent Valley around Willington, is at the centre of the country and is easily accessible from all directions, due to the Valley itself, and also due to its position at the southern end of the

Pennine uplands. The Trent Valley also sits on the topographic mid-point of England, looking north and west towards the uplands and south and east towards the rolling lowlands. Neolithic archaeology in the Trent Valley shows connections with both the north and the south. The latter by the presence of cursus monuments (i.e. Potlock/Findern - Wheeler 1970, Guilbert 1996; Aston - Gibson and Loveday 1989, Elliott and Garton 1995; Catholme – Chapman 2009) and the recently discovered 'woodhenge' and 'sunburst' monuments at Catholme (Chapman 2009) together with occasional examples of Ebbsfleet Ware and other southern ceramic traditions, whilst the more commonly occurring ceramic forms recall the northern Carinated Bowl traditions, whilst the northern tributary valleys of the Trent are home to panels of cup and ring marked rocks which is primarily a northern tradition.

Early Bronze Age

Early Bronze Age activity on the site is represented by a combination of funerary monuments in the form of the two ring ditches and associated cremation burials, together with possible settlement or further funerary activity represented by the post-built structures 1-4.

The principal cremation pit (F1113) is the most interesting of the funerary features as it clearly demonstrates the re-use of this pit for successive burials and the importance of this place in the landscape over a period of time. Three phases of activity were evident within this cremation pit. The primary phase was the original cut for the pit and deposition of a cremation in a ceramic vessel with decoration recalling the Durrington Walls Grooved Ware tradition, even though the pot belongs to the Early Bronze Age on account of the dated wheat grain from the primary pit fill, estimated to date from *1880-1690 cal BC* (*95% probability*). The pit was then recut and a vessel (pot 78) containing a human cremation was inserted between *130-390 years* later (*95% probability*). A surviving basal section of this vessel was able to be lifted intact (Plate 4). This burial is estimated to date to *1610-1450 cal BC* (*95% probability*) (Fig. 23). A third phase of activity saw another vessel (pot 1) containing a cremation inserted into the upper part of the pit, although this vessel had been broken and spread due to plough action. The continued re-use of the same pit implies that it was marked in some way above ground, and also speaks of the importance of this landscape, and specifically this particular area, for funerary use over what may have been several generations.

Structures 1 and 3 are two of the key features on the site and take the form of triangular post-built structures, with Structure 3 also including a large number of outlying stakeholes. This particular form of structure is directly comparable to a number of recently observed examples from Northumberland: Bolam Lake (Waddington and Davies 2002) dating to the Early Neolithic, Lanton Quarry (Stafford 2007) and Whitton Park, Milfield (Waddington 2006) dating to the Late Neolithic and Early Bronze Age. It has been argued that these structures represent the central load-bearing frame for larger structures (Waddington and Davies 2002). At Bolam Lake there were a small number of outlying stakeholes which could represent lighter spars and stakes forming part of the structure, and this argument could be supported by the volume of stakeholes surrounding Mercia Marina Structure 3. Radiocarbon dates obtained on material from postholes in Structures 1 and 3 suggest that this form of structure has a long currency of use, potentially dating from the Neolithic as in the case of the Bolam Lake site, through to the Early Bronze Age, as is the case at Mercia Marina (Table 1).

The six postholes forming Structure 2 were truncated and it is impossible to ascribe a clear structural form or use. It is possible however to suggest a tentative parallel to 'six-post' structural remains observed at Lanton Quarry, Northumberland (Stafford 2007), which

have been dated provisionally to the Early-Mid Bronze Age through diagnostic pottery sherds within their fills. Whilst the Lanton structures are larger overall and their constituent postholes are larger and more deeply-set, it should be noted that the landscape setting and associated archaeological features are similar, so the structures may have served a similar purpose. In the case of the Lanton Quarry site these six-post rectangular structures were spatially related to Bronze Age roundhouses and it remains possible that the structure at Mercia Marina is of a similar age and purpose.

Whilst it is possible that the post-built structures may be associated with the funerary practices for which the site was clearly being used, such as excarnation or pyre platforms, the presence of funerary monuments does not preclude the presence of contemporary domestic structures. It has been attested from other sites of the Early Bronze Age, across a variety of geologies, including the gritstone uplands of the Peak District where it is not uncommon to find contemporary settlement and funerary monuments close together (Barnatt 1996). Pollen evidence collected from the site suggests a landscape during the Early Bronze Age in which both cereal cultivation and grazing of domestic animals took place. This would support the possibility that there was a single focus on this site for both domestic and funerary practice.

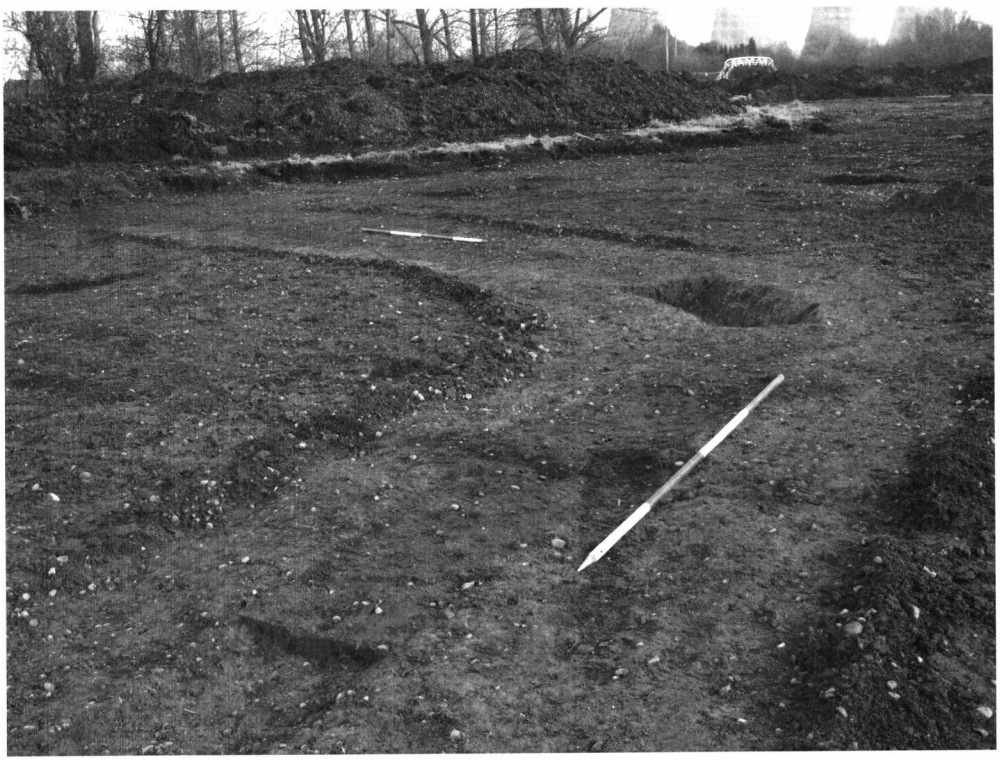


Plate 6: Linear feature F031 in Area 1. The linear features were anticipated from aerial photography, but the strip, map and sample approach identified a substantial amount of archaeological features invisible to aerial photography.

Middle Bronze Age

Middle Bronze Age Mercia Marina is represented by the midden pit (F003) in Area 1 which yielded Deverel-Rimbury pottery characteristic of this period. Other than revealing the presence of Middle Bronze Age activity, little more can be inferred from this discovery other than noting the presence of charred wheat grain within the fill of the pit.

Later Prehistory

Use of the area in later prehistory is represented by linear features dividing the site in Area 2, and the linear features, pit alignment and rectilinear ditch feature in Area 1 (Plate 6). Whilst there was little artefactual material retrieved from these features it is possible to view the later prehistoric landscape of this area as divided up by clear boundaries, suggesting an enclosed landscape, perhaps with land ownership and intensively exploited. Such features are largely absent or invisible in preceding periods. The clearest comparisons to this are the nearby Willington Quarry site (Wheeler 1979; Beamish 2001, 2009), Swarkestone Lowes a few kilometres to the east which had an Iron Age component to the site comprising a pit alignment and linear features (Knight 1992; Whimster 1989; Losco-Bradley 1993) and the large later prehistoric site at Fisherwick some 24km south-west on the gravels of the River Tame (Smith 1979).

The archaeological remains represent a palimpsest which provides detailed insights and has potential to contribute not only to the regional history of prehistoric settlement and land use in the Trent Valley and its environs, but also to our understanding of the way Trent Valley groups interacted with other groups in distant areas. Discoveries at Mercia Marina provide a body of information which can be used to underpin wider accounts of the early history of the Trent Valley.

ACKNOWLEDGEMENTS

The authors would like to thank all those who contributed to this project. In particular the generous support of the developers Madecorn Leisure, especially John Thornton, and all on site at the Mercia Marina development. Thanks is also due to Dr. Andrew Myers, then of Derbyshire County Council, who supported and advised on the project throughout. The authors would also like to thank Peter Marshall who, as well as contributing to the radiocarbon dating section also provided comments on a draft of this article. Last but by no means least, the authors would like to extend thanks to all the archaeological site staff who braved some trying conditions to provide the data presented here. They are: Elisa Alonso Lopez, Charlotte Burrill, Richard Chatterton, Ben Johnson, Andrew Lane, Brian Marshall, Lisa Parfitt, Tim Sandiford, Gemma Shannahan, Jessika Sheppy, Louis Stafford, Jess Tibber and Stewart Winthrope.

REFERENCES

Allen, C.S.M., Harman, M. and Wheeler, H. (1987) Bronze Age cremation cemeteries in the East Midlands. *Proceedings of the Prehistoric Society* 53: 187-221.

Alvey, R.C. (1966) In *East Midland Archaeological Bulletin* 9 (1966) 35.

Ashmore, P. (1999) Radiocarbon dating: avoiding errors by avoiding mixed samples, *Antiquity* 73: 124–30.

Barber, K.E. (1976) History of Vegetation. Methods in S.B. Chapman (ed.) *Plant Ecology.* Oxford, Blackwell.

Barber, M., D. Field and Topping, P. (1999) *The Neolithic flint mines of England.* Swindon, English Heritage.

Barnatt, J. (1996) Barrows in the Peak District: a Review and Interpretation of Extant Sites and Past Excavations. In J. Barnatt and J. Collis (eds) *Barrows in the Peak District. Recent Research.* Sheffield. J.R. Collis.

Barrett, J.C. (1976) Deverel-Rimbury: problems of chronology and interpretation. In C.B. Burgess and R. Miket (eds) *Settlement and Economy in the Third and Second Millennia BC.* British Archaeological Reports, British Series 33, Oxford: 289-307.

Barrett, J.C., Bradley, R., Cleal, R. and Pike, H. (1978) Characterisation of Deverel-Rimbury pottery from Cranbourne Chase. *Proceedings of the Prehistoric Society* 44: 134-42.

Bayliss, A, Bronk Ramsey, C, van der Plicht, J, and Whittle, A. (2007) Bradshaw and Bayes: towards a timetable for the Neolithic. *Cambridge Archaeological Journal* 17: 1–28.

Beamish, M.G. (2009) Neolithic and Bronze Age Activity on the Trent Valley Floor. Excavations at Egginton and Willington, Derbyshire 1998-1999. *DAJ*: 17-172.

Beug, H.J. (2004) *Leitfaden der Pollenbestimmung für Mitteleuropa und angrenzende. Gebiete.* München, Pfeil.

Bronk Ramsey, C. (1995) Radiocarbon Calibration and Analysis of Stratigraphy: The OxCal Program. *Radiocarbon* 37: 425–30.

Bronk Ramsey, C. (1998) Probability and dating. *Radiocarbon* 40: 461–74.

Bronk Ramsey, C. (2001) Development of the radiocarbon calibration program OxCal. *Radiocarbon* 43: 355–63.

Bronk Ramsey, C. (2009) Bayesian analysis of radiocarbon dates. *Radiocarbon* 51(1): 337-360.

Buck, C.E., Cavanagh, W.G., and Litton, C.D., (1996) *Bayesian Approach to Interpreting Archaeological Data.* Chichester.

Buteux, S. and Chapman, H. (2009) *Where Rivers Meet – the Catholme Ceremonial Complex and the Archaeology of River Gravels: Research at the Confluence of the Trent and Tame Rivers in Staffordshire.* London, English Heritage and the Council for British Archaeology.

Chapman, H. (2009) Catholme. *British Archaeology* March April 2009: 21-25.

Chapman, H.P., Hewson, M, and Wilkes, M.S., (2010) The Catholme Ceremonial Complex, Staffordshire, UK. *Proceedings of the Prehistoric Society* 76: 135-163..

Clapham, A., Tutin, T. and Warburg, E. (1957) *Flora of the British Isles.* Cambridge. Cambridge University Press.

Cleal, R. and MacSween, A. (eds) (1999) *Grooved Ware in Britain and Ireland.* Oxford. Oxbow Books.

Collcut, S. (2006) Appendix 2: Palaeolithic prospection: some simple guidelines. In N.J. Cooper (ed.) *The Archaeology of the East Midlands. An Archaeological Resource Assessment and Research Agenda.* Leicester. Leicester Archaeology Monograph 13: 46-9.

Collis, J. (1983) *Wigber Low Derbyshire: A Bronze Age and Anglian Burial Site in the White Peak.* Sheffield. The Department of Prehistory and Archaeology, University of Sheffield.

Courtney, T. (1973) Excavations at Melbourne, Derbyshire. *DAJ* 96: 62-9.

Delcourt, P.A. and Delcourt, H.R. (1980) Pollen preservation and Quaternary environmental history in the south eastern United States. *Palynology* 4: 215-31.

Elliott, L. and Garton, D. (1995) *Acre Lane, Aston: Recording of the Aston Cursus along a Newly-cut Storm Drain on the Line of the Derby Southern Bypass.* Unpublished report, Trent and Peak Archaeological Trust.

Elliott, L. and Knight, D. (1999) An Early Mesolithic Site and First Millennium BC Settlement and Pit Alignments at Swarkestone Lowes, Derbyshire. *DAJ* 119: 79-153.

Elsdon, S.M. (1979) Iron Age Pottery. In H. Wheeler (ed.) Excavation at Willington, Derbyshire, 1970-72. *DAJ* 99: 162-78.

Faegri, K. and Iversen, J. (1989) *Textbook of pollen analysis*, 4th edition. New York, John Wiley and Sons.

Ferrell, G. (1990) A Reassessment of the Prehistoric Pottery from the 1952-62 Excavations at Yeavering. *Archaeologia Aeliana* 5th ser. 18: 29-49.

Ford, S. (1987) Flint scatters and prehistoric settlement patterns in south Oxfordshire and east Berkshire. In A. Brown and M. Edmonds (eds) *Lithic Analysis and Later British Prehistory*. Oxford, British Archaeological Reports British Series 162: 101-135.

Gardiner, J. (1984) Lithic Distributions and Settlement Patterns in Central Southern England. In R. Bradley and J. Gardiner (eds) *Neolithic Studies. A Review of Some Current Research*. Oxford. British Archaeological Reports 133: 15-40.

Garrow, D. (2007) Placing pits: landscape occupation and depositional practice during the Neolithic in East Anglia. *Proceedings of the Prehistoric Society* 73: 1-24.

Garton, D. (1991) Neolithic settlement in the Peak District. In R. Hodges and K. Smith. *Recent Developments in the Archaeology of the Peak District*. Sheffield. Sheffield Archaeological Monographs 2, University of Sheffield: 3-21.

Garton, D. and Beswick, P. (1983) The survey and excavation of a Neolithic settlement area at Mount Pleasant, Kenslow, 1980-1983. *DAJ* 103: 7-40.

Gibson, A. (1999) *The Prehistoric Pottery from the 1987 and 1988 Excavations at Lyles Hill, Co. Antrim*. Report prepared for Queen's University, Belfast.

Gibson, A. (2002a) *Prehistoric Pottery in Britain and Ireland*. Stroud, Tempus.

Gibson, A.M. (2002b) A matter of pegs and labels: a review of some of the prehistoric pottery from the Milfield basin. *Archaeologia Aeliana* 5th ser. 30: 175-180.

Gibson, A.M. and Woods, A. (1997) *Prehistoric Pottery for the Archaeologist*. London and Washington. Leicester University Press.

Gibson, A. and Loveday, R. (1989) Excavations at the cursus monument of Aston-Upon-Trent, Derbyshire. In A. Gibson (ed.) *Midlands Prehistory. Some recent and current researches into the Prehistory of central England*. Oxford. British Archaeological Reports: 27-50.

Greenfield, E. (1960) The Excavation of Barrow 4 at Swarkeston. *DAJ* 80: 1-48.

Greenwell, W. and Rolleston, G. (1877) *British Barrows*. Oxford, Clarendon Press.

Guilbert, G. (1996) Findern is dead, long live Potlock - the story of a cursus on the Trent gravels. *Past (The newsletter of the Prehistoric Society)* 24: 13-18.

Guilbert, G. and Elliott, L. (1999) Post ring round-house at Swarkestone Lowes. *DAJ* 109: 154-175.

Hart, C. R. (1981) *The North Derbyshire Archaeological Survey*. Leeds. The North Derbyshire Archaeological Trust, Chesterfield.

Hedges, J. (1975) Excavation of two Orcadian burnt mounds at Liddle and Beaquoy. *Proceedings of the Society of Antiquaries of Scotland* 106: 39-98.

Herne, A. (1988) A time and place for the Grimston Bowl. In J.C. Barrett & I.A. Kinnes (eds) *The Archaeology of Context in the Neolithic and Bronze Age: Recent Trends*: 9-29. Sheffield University, Department of Archaeology and Prehistory.

Hey, G. and Lacey, M. (2001) Evaluation of Archaeological Decision-making *Processes and Sampling Strategies*. Oxford, Oxford Archaeological Unit.

Hope-Taylor, B. (1977) *Yeavering. An Anglo-British Centre of Early Northumbria*. London, H.M.S.O.

Hughes, G. and Jones, L. (1995) *Further Archaeological Work at Hill Farm, Willington, Derbyshire, July 1995: Phase 1*. Unpublished Report, Birmingham University Field Archaeology Unit.

Hughes, G. and Jones, L. (2001) *The Excavation of an Early Neolithic Pit Group and later prehistoric features at Hill Farm, Willington, Derbyshire 1996. Interim Report*. Unpublished Report, Birmingham University Field Archaeology Unit.

Jacobi, R. (2006) Appendix 1: A list of radiocarbon dates for the East Midlands. In Cooper, N.J. (ed.) *The Archaeology of the East Midlands. An Archaeological Resource Assessment and Research Agenda*. Leicester, Leicester Archaeology Monograph 13: 44-5.

Jobey, G. and Newman, T.G. (1975) A Collared Urn cremation on Howick Heugh, Northumberland. *Archaeologia Aeliana* 5th Ser. 3: 1-16.

Johnson, B. and Waddington, C. (2008). Excavation of Prehistoric and Dark Age sites at Cheviot Quarry, Milfield Basin, Northumberland. *Archaeological Journal*: 107-264.

Kelly, J. H. (1960) Excavations at Raynard's Cave, Derbyshire. *DAJ* 81: 117-23.

Knight, D. (1998) The Derby southern bypass. *Current Archaeology* 157: 32-33.

Knight, D. and Howard, A.J. (2004) *Trent Valley Landscapes. The Archaeology of 500,000 Years of Change*. King's Lynn, Heritage Marketing and Publications Ltd.

Lanting, J.N., Aerts-Bijma, A.T. and van der Plicht, J. (2001) Dating of cremated bones. *Radiocarbon* 43: 249–54.

Longley, D.M.T. (1987) Prehistory. In B.E. Harris and A.T. Thatcher (eds) *A History of the County of Chester 1. The Victoria County History of the Counties of England*. London, Oxford University Press: 36-114.

Manby, T.G. (1965) The excavation of the Green Low chambered tomb. *DAJ* 85: 1-24.

Manby, T.G. (1975) Neolithic Occupation Sites on the Yorkshire Wolds. *Yorkshire Archaeological Journal* 47: 23-59.

Manby, T.G. (1979) Neolithic and Bronze Age Pottery. In H. Wheeler (ed.) Excavation at Willington, Derbyshire, 1970-72. *DAJ* 99: 146-62.

Manby, T.G. (1983) Prehistoric Pottery. In J. Collis, 1983. *Wigber Low Derbyshire: A Bronze Age and Anglian Burial Site in the White Peak*. Sheffield. The Department of Prehistory and Archaeology University of Sheffield: 53-60.

Manby, T.G. (1988) The Neolithic in Eastern Yorkshire. In T.G. Manby (ed.) *Archaeology in Eastern Yorkshire. Essays in Honour of T.C.M. Brewster FSA*. Department of Archaeology and Prehistory University of Sheffield, John R. Collis: 35-88.

Manby, T.G. (1996) *Prehistoric Pottery: Marton-le-Moor and Roecliffe*. Report for Northern Archaeological Associates (Barnard Castle).

McGuire, S. (2004) *Test Pitting at the Gliding Club Car Park Camphill, Great Hucklow 2003*. Unpublished Report.

McKinley, J.I. (2004) Compiling a skeletal inventory: cremated human bone. In Brickley, M. and J.I. McKinley. *Guidelines to the Standards for Recording Human Remains*. London. BABAO: 9-13.

McKinley, J.I. (1997) Bronze Age 'Barrows' and Funerary Rites and Rituals of Cremation. *Proceedings of the Prehistoric Society* 63: 129-145.

McKinley, J.I. (1998) Archaeological Manifestations of Cremation. *The Archaeologist* 33: 18-20.

McKinley, J.I. (2000a) Putting cremation remains in context. In s. Roskams (ed.) *Interpreting Stratigraphy: Site Evaluation, recording procedures and stratigraphic analysis. BAR (International Series 910)*. Oxford, Archaeopress: 135-140.

McKinley, J.I. (2000b) Phoenix rising: aspects of cremation in Roman Britain. In M. Millet, J. Pearce and M. Struck (eds) *Burial, Society and Context in the Roman World.* Oxford,.Oxbow Books: 38-44.

Moore, P.D., Webb, J.A. and Collinson, M.E. (1991) *Pollen Analysis*. (2nd Edition) London. Blackwell.

Miket, R. (1976) The evidence for Neolithic activity in the Milfield basin, Northumberland. In C. Burgess and R. Miket (eds) *Settlement and Economy in the Third and Second Millennia BC*. Oxford. British Archaeological Reports No 33: 113-142.

Miket, R. (1987) *The Milfield Basin, Northumberland 4000 BC - AD 800*. Unpublished MLitt Thesis, University of Newcastle Upon Tyne.

Miket, R., Edwards, B. and O'Brien, C. (2008) Thirlings: A Neolithic site in Northumberland. *Archaeological Journal* 165: 1-106.

Monckton, A. (2001) Interim statement on the charred plant remains. In G. Hughes, and L. Jones. (eds) *The Excavation of an Early Neolithic Pit Group and later prehistoric features at Hill Farm, Willington, Derbyshire 1996. Interim Report*. Unpublished Report, Birmingham University Field Archaeology Unit.

Mook, W.G. (1986) Business Meeting: recommendations/resolutions adopted by the twelfth international radiocarbon conference. *Radiocarbon* 28: 799.

Mook, W.G. and Waterbolk, H.T. (1985) *Radiocarbon Dating, Handbook for Archaeologists 3.* Strasbourg, European Science Foundation.

Passmore, D. G. and Waddington, C. (2009) *Managing Archaeological Landscapes in Northumberland. Till-Tweed Studies Vol. I.* Oxford, Oxbow.

Passmore, D.G. and Waddington, C. (in p ress) *Archaeology and Environment in Northumberland. Till-Tweed Studies Volume II.* Oxford, Oxbow.

Pitts, M. W. and Jacobi, R.M. (1979) Some Aspects of Change in Flaked Stone Industries of the Mesolithic and Neolithic in Southern England. *Journal of Archaeological Science* 6: 163-177.

Posnansky, M. (1955) The Bronze Age round barrow at Swarkeston. Part I: the excavation and finds. *DAJ* 75: 123-139.

Reaney, D. (1968) Beaker Burials in South Derbyshire. *DAJ* 88: 68-81.

Reimer, P.J., Baillie, M.G.L., Bard, E., Bayliss, A., Beck, J.W., Bertrand, C., Blackwell, P.G., Buck, C.E., Burr, G., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hughen, K.A., Kromer, B., McCormac, F.G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J. and Weyhenmeyer, C.E. (2004) IntCal04 Terrestrial radiocarbon age calibration, 0–26 Cal Kyr BP. *Radiocarbon* 46:1029–1058.

Reynolds, P. (1995) The life and death of a post-hole. *Interpreting Stratigraphy* 5: 21–5.

Richards, J.D. (2004) Excavations at the Viking barrow cemetery at Heath Wood, Ingleby, Derbyshire. *The Antiquaries Journal* 84: 23-116.

Robinson, M. (1988) The significance of the tubers of Arrhenatherum elatius (L.) Beauv. from Site 4, cremation 15/11.In G. Lambrick (ed.) *The Rollright Stones: Megaliths, monuments and settlement in the prehistoric landscape.* London, English Heritage Archaeological Report 6

Saville, A. (1979) Flint Artifacts in Excavation at Willington, Derbyshire, 1970-1972. *DAJ* 99: 133-44.

Saville, A. (1980)_ On the measurement of struck flakes and flake tools. *Lithics* 1: 16-20.

Scott, E.M. (2003) The third international radiocarbon intercomparison (TIRI) and the fourth international radiocarbon intercomparison (FIRI) 1990 – 2002: results, analyses, and conclusions. *Radiocarbon* 45: 135–408.

Schofield, A. J. (1991) Artefact distributions as activity areas: examples from south-east Hampshire. *Interpreting Artefact Scatters: Contributions to Ploughzone Archaeology*. Oxford, Oxbow Books. Monograph 5: 117-128.

Schofield, A. J. (1994) Lithic Artefacts from test-Pit Excavations on Lundy: Evidence for Mesolithic and Bronze Age occupation. *Proceedings of the Prehistoric Society* 60: 423-431.

Schwartz, J.H. (1995) Skeleton Keys: An Introduction to Human Skeletal *Morphology, Development and Analysis*. Oxford, Oxford University Press.

Sheridan, A. (2007) From Picardie to Pickering and Pencraig Hill? New information on the 'Carinated Bowl Neolithic' in northern Britain. In A. Whittle and V. Cummings (eds) Going Over: The Mesolithic-Neolithic Transition in North-West Europe. *Proceedings of the British Academy* 144: 441-492. Oxford. Oxford University Press.

Smith, C. (ed.) (1979) *Fisherwick.* BAR British Series 61. Oxford, Archaeopress.

Smith, I. F. (1956) *The decorative art of Neolithic ceramics in south-eastern England and its relations*. Unpublished PhD Thesis, University of London.

Stace, C. (1997) *New Flora of the British Isles*. 2nd Edition. Cambridge. Cambridge University Press.

Stafford, L. (2007) *Excavation at Lanton Quarry, Northumberland.* Unpublished Excavation Report for Tarmac Northern Ltd. Gateshead, ARS Ltd.

Stockmarr, J. (1971) Tablets with spores used in absolute pollen analysis. *Pollen and Spores* 13: 615-621.

Stuiver, M. and Kra, R.S. (1986) Editorial comment. *Radiocarbon.* 28(2B): ii.

Stuiver, M. and Polach, H.A. (1977) Reporting of 14C data. *Radiocarbon* 19: 355–63.

Stuiver, M. and Reimer, P.J. (1986) A computer program for radiocarbon age calculation. *Radiocarbon* 28: 1022–30.

Stuiver, M. and Reimer, P.J. (1993) Extended 14C data base and revised CALIB 3.0 14C age calibration program. *Radiocarbon* 35: 215–30.

Tavener, N. (1996) Evidence of Neolithic activity at Marton-le-Moor, North Yorkshire, in P Frodsham (ed.) *Neolithic Studies in No-Man's Land: Papers on the Neolithic of Northern England from the Trent to the Tweed.* Northern Archaeology 183-7.

Thomas, J. (1999) *Understanding the Neolithic.* London, Routledge.

Varley, W. (1950) Excavations of the Castle Ditch, Eddisbury 1935-1938. *Transactions of the Historic Society of Lancashire and Cheshire* 102: 1-68.

Van Geel, B. (1998) *A study of non-pollen objects in the pollen slides.* Utrecht, Utrecht University.

Van Geel, B. (2006) Fossil ascomycetes in Quaternary deposits. *Nova Hedwigia* 82: 313-329.

Vyner, B. (1998) *Prehistoric Pottery From Nosterfield.* Unpublished report for Archaeological Planning Consultancy. www.archaeologicalplanningconsultancy.co.uk/thornborough/search_deliver.php?Unique_ID=26&Page=1/1

Waddington, C. (2000) Neolithic pottery from Woodbridge Farm, the Old Airfield, Milfield. *Archaeologia Aeliana* 5th ser. 28: 1-11.

Waddington, C. (2001) The Lithic Assemblage. In Hodgson *et al.* An Iron Age settlement and remains of earlier prehistoric date beneath South Shields Roman Fort, Tyne and Wear. *Archaeological Journal* 158: 62-160.

Waddington, C. (2004) *The Joy of Flint: An Introduction to Stone Tools and Guide to the Museum of Antiquities Collection.* Newcastle upon Tyne, Museum of Antiquities of Newcastle upon Tyne.

Waddington, C. (ed.) (2007) *Mesolithic Settlement in the North Sea Basin: A Case Study from Howick, North-East England.* Oxford, Oxbow Books.

Waddington, C. (2008) *Dale View Quarry Lithic Report.* ARS Ltd unpublished archive report.

Waddington, C. (2008a) *Mineral Extraction and Archaeology: A Practice Guide.* London, English Heritage on behalf of the Minerals and Historic Environment Forum.

Waddington, C. (in prep). *Geoarchaeology and Landscape Archaeology in the Milfield Basin.* Oxford. English Heritage and Oxbow.

Waddington, C. and Davies, J. (2002) An Early Neolithic Settlement and Late Bronze Age Burial Cairn near Bolam Lake, Northumberland: fieldwalking, excavation and reconstruction. *Archaeologia Aeliana* 5 vol. 30: 1-47.

Wainwright, G. J. and Longworth, I.H. (1971) *Durrington Walls: Excavations 1966-1968.* London, Society of Antiquaries Report 29.

Ward, G.K. and Wilson, S.R. (1978) Procedures for comparing and combining radiocarbon age determinations: a critique. *Archaeometry* 20(1): 19–31.

Ward, J. (1889) On Rain's Cave, Longcliffe, Derbyshire. *DAJ* 11: 31-45.

Wheeler, H. (1970) The Findern cursus. *DAJ* 90: 4-7.

Wheeler, H. (1979) Excavation at Willington, Derbyshire, 1970-1972. *DAJ* 99: 58-220.

Woodman, P. (1985) *Excavations at Mount Sandel 1973-77.* Belfast. Department of the Environment for Northern Ireland.

Woodward, A. and Hancocks, A. (2001) Interim Statement on the Prehistoric Pottery. In G. Hughes and L. Jones. (eds) *The Excavation of an Early Neolithic Pit Group and later prehistoric features at Hill Farm, Willington, Derbyshire 1996. Interim Report.* Unpublished Report, Birmingham University Field Archaeology Unit.

Zondervan, A. and Sparks, R.J. (1997) Development plans for the AMS facility at the Institute of Geological and Nuclear Sciences, New Zealand. *Nuclear Instruments and Methods in Physics Research B* 123: 79–83.